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Chasing Organics: A Study of the Implications of Act 148 on Vermont's Waste Hauling and Composting Enterprises

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Chasing Organics: A Study of the Implications of Act 148 on Vermont's Waste Hauling and Composting Enterprises

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*In partial fulfillment of a Bachelor of Sciences degree
College of Agriculture and Life Science
University of Vermont 2014*



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ABSTRACT

This research addresses the impacts of Act 148 on haulers and composters in the State of Vermont. The Act outlines the importance of organic waste diversion as well as increased recycling rates. This research focuses on the impacts of increased organic waste diversion for the waste hauling and composting operations in Vermont. Interviews were used to complete an ethnographic study on individuals involved in Vermont's organic waste stream. Eleven interviews were conducted; five with composters and six with hauling businesses. This resulted in a greater understanding of how the waste management community understands the impact of Act 148, what their biggest challenges are as it becomes implemented, and how they predict the future of waste in Vermont to change under the new law.

KEY WORDS

Waste Diversion – Diverting waste from the landfill for recycling, composting or future use.

Organic Waste - Material derived from living organisms such as leaf and yard debris, food scraps, clean wood and paper and paperboard products (Agency of Natural Resources, 2013).

Pay As You Throw/ Variable Rate Pricing – A pricing strategy for hauling businesses to charge for waste pick up. It is based on a regimented pick up of a container of refuse, recycling or organic waste.

Compost Community – A group of compost business owners that form a community.

Extended Producer Responsibility – Placing responsibility of industry to take care of the end-life of the products they produce.

Hauling Community – A group of waste hauling businesses that form a community.

Compost Association of Vermont – An association of compost entities that work with the Agency of Natural Resources to generate solutions to common problems.

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INTRODUCTION

This thesis is centered on Act 148 in Vermont, a law that mandates that all recyclable and organic waste be diverted from the landfill by the year 2020. This law will reach everyone in VT, from large business and universities, to individual households. The research conducted in this thesis corresponds with the organic waste aspects of Act 148. Specifically, the research delves into how the Act affects the processes and functions of composting facilities and haulers across the state. The main question of this research is how the state of Vermont plans to deal with the issue of having insufficient infrastructure to compost all of the food waste and organics in the State's waste stream. This includes structural composting facilities as well as transportation of organic waste, and how waste haulers are affected by the Act. Results obtained pertain the information obtained through interviews. The research is also based on how much organic waste is currently brought into each facility and how much more compost facilities can manage.

The second part of this study looks at the potential of increased organic waste on compost sites. Act 148 will make history, as Vermont will be the only state mandating that all organics be diverted from the landfill. This is representative of a transformative time in Vermont and calls for new ideas and innovations. While the state of Vermont is booming in the local food industry, and is working towards a 90 percent renewable energy portfolio by 2050, my research looks at the organic waste side of Vermont's future sustainability goals.

This research is important because it looks at the future waste system of Vermont including how the Act should be carried out and the impressions of those who are required to change business strategies as a result. This research will allow for better preparation in executing the Act and will help legislators understand the potential effects the Act will have on composting

facilities and waste transportation in Vermont. I intend to share this information with the Agency of Natural Resources as well as state composters and haulers through writing a short report outlining my findings. My research will also help to envision innovative business strategies for dealing with the organic waste stream in Vermont. By writing a shorter report for issue, my research will help inform state officials, composters, and haulers about the wider view of the Act and how it will affect the state and those that manage its organic waste.

LITERATURE REVIEW

Introduction

This literature review examines how organic solid waste is managed, how it is regulated, the policies set in place to mandate diversion from landfills and the history of composting. Act 148, a Vermont law mandating that organics be diverted from landfills, will be outlined in this literature review as well. The review will explain what the Act is, how it works and its importance to the state of Vermont.

As America's landfills fill and material consumption increases, it is increasingly important to divert valuable waste from landfills. Valuable waste is recyclable or compostable material that is created in our waste stream (Kessler & Kessler, 2010; Zhang, Banks, & Heaven, 2012). The United States annually produces 66 million dry tons of manure, 7 million dry tons of biosolids and 55 million tons (wet weight) of municipal solid waste organics (yard trimmings and food waste) (Alexander, 2009b). Today there are over 3,000 commercial composters in the U.S. In addition, there are many businesses supplying the processing infrastructure for these commercial composters (Kessler & Kessler, 2010). This results in an estimation of 4,500 to 5,000 composting facilities in existence in the U.S. (Alexander, 2009b).

According to a recent study, 40 percent of prepared and fresh food in the U.S goes uneaten resulting in billions of dollars worth of food ending up in landfills (Rubenstein, 2013). Our current waste stream dumps significant amounts of valuable materials into landfills. Many of these organic materials consist of food waste, agricultural crop residue, leaves and yard clippings, branches and stumps, chipped wood and manure (Berumen, 2009). Composting is a way to take these materials and recycle the nutrients into valuable soil amendments and fertilizer (Composting Association of Vermont, 2008). The difference between landfilling and composting can be represented in terms of greenhouse gas emissions. For example, five gallons of food scraps sent to a compost facility rather than a landfill prevents green house gas emissions equivalent to burning over one gallon of gasoline (Highfields Center for Composting, 2011).

History of the Composting Industry

Composting as a practice has been around since the early 1900's when Sir Albert Howard systematized compost procedures. Howard developed a system known as the Indore system, after the region of India where it was developed. Composting developed out of the need for sanitation rather than conservation and was used to improve human waste hygiene and reduce fly-breeding (Golueke, 2009). The rise of compost use, as we understand it today, came about in the 1940's and 50's as a means of reclaiming plant nutrients in municipal waste. It was used as a process for solid waste disposal.

With the rise of industrialization, composting has faced two main difficulties. The first was an over-reliance on composting to fix the solid waste management issues in the county. The second was that the success of composting was only measured on the basis of financial returns from the sales of the product. This set composting up in a different light than other municipal

solid waste processing, as other waste is judged by its contamination of the environment (Golueke, 2009).

The 1960's were a time of financial failures for compost facilities. The economic bottom line of composting became so bleak that composting as a form of solid waste management almost entirely disappeared (Golueke, 2009). However, there were a few facilities dedicated to the act of composting that kept the process alive. This collapse also paved the way for a truly realistic approach to the use of composting as a solid waste management procedure (Golueke, 2009).

The late 1960's brought a growing public concern for preserving the environment and a willingness to do something about it. In 1965 the Solid Waste Disposal Act, an act created as part of the amendments to the Clean Air Act, was the first federal law that required environmentally sound methods for disposal of household, municipal, commercial and industrial waste. Subsequently, the Resource Conservation and Recovery Act (RCRA) was created to increase federal government involvement in solid waste management (United States Environmental Protection Agency, 2013). The RCRA is the primary law governing the disposal of solid and hazardous waste. It was passed in 1976 to address the issue of the growing volume of waste in the U.S. This act amended the Solid Waste Disposal Act and set national goals for “protecting human health and the environment from the potential hazards of waste disposal, conserving energy and natural resources, reducing the amount of waste generated, and ensuring that wastes are managed in an environmentally-sound manner.” (U.S. Environmental Protection Agency, 2013)

Composting has been continually recognized as a necessary means of diverting the current waste stream from the landfill. Today, composting has nearly turned into an art of soil

making. In addition to its importance in nutrient dense soils, composting has grown with landfill bans on yard trimmings. As organic waste increased and landfills filled, commercial composting facilities were built in the 1990's due to the large amount of mixed waste. On-farm composting was also in the process of expansion during this time.

It is estimated that currently there are between 4,500 to 5,000 composting facilities in the United States. Although composting has expanded, it is not nearly large enough to receive the exponentially increasing amount of compostable waste (Alexander, 2009a). In January of 2013 the United States Composting Council (USCC), a council that works to advance composting, promote the use of compost to improve soil quality and provide economic and environmental benefits to members of the organic waste society, released a set of model rules for composting facilities across the states. This model assists states in revising their current regulations in order to create new ones. The rule template is comprised of a three- tiered permit structure, including design and operation requirements. This is based on the type of material being composted and the technology used (Virga, 2013). This is important because the composting industry has evolved over the years to be of high monetary value, however it does not have a unified set of modeling rules to help states develop composting programs.

History of Zero Waste

Historically waste has been disposed of in three different ways; burning it, burying it in a landfill, and dumping it in the ocean. None of these are appropriate in fostering sustainable habits of consumption or disposal, and one of them (ocean dumping) is now banned worldwide (Connett, 2013). However, in the 1990's a new technique and philosophy for dealing with waste

surfaced, 'Zero Waste'. In the 2004 Zero Waste International Alliance 'zero waste' was defined as

“A goal that is ethical, economical, efficient and visionary, to guide people in changing their lifestyles and practices to emulate sustainable natural cycles, where all discarded materials are designed to become resources for further use.

Zero Waste means designing and managing products and processes to systematically avoid and eliminate the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them.

Implementing Zero Waste will eliminate all discharges to land, water or air that are a threat to planetary, human, animal or plant health” (Connett, 2013).

The concept of 'Zero Waste' arose in the mid 1990s in Canberra, Australia when the slogan “No Waste by 2010” was adopted after politicians asked the citizens how much waste they felt should be going into the landfill and the response was none (Connett, 2013). At the same time, in Berkeley California, Daniel Knapp was developing a business dedicated to recovering waste from the landfill. This business, based on scavenging waste, soon turned into a major reuse and recycling center in the 1990's called Urban Ore. Knapp saw all waste as entering into one of 12 different categories and argued for “total or 100 percent recycling” (Connett, 2013). His business was revolutionary in that it presented the notion that nearly all 'waste' can be used as a resource.

The two ideas collided when politicians in Canberra found out about Knapp's work and invited him to speak about his ideas and vision for the future. He presented his ideas and tactics for reaching zero waste in Canberra and Melbourne. The collision of ideas created a vision for zero waste. His slogan of 'total recycling' matched with Canberra's slogan, 'No Waste by 2010' resulted in the phrase 'Zero Waste.' Knapp spread the word of government support of 'zero waste' in Canberra via Internet and it soon went viral in the United States. He found that selling the concept of 'zero waste' was much easier than 'total recycling.' However the success and

support Knapp experienced in the U.S was not fulfilled in Canberra. Unfortunately in 2000 a new party took control in Canberra and the vision of ‘zero waste’ was lost to new legislation before the 2010 goal (Connett, 2013).

Knapp reflected on the reasons why ‘zero waste’ caught on and not ‘100 percent recycling.’ He concluded that,

“Total recycling implies that the community has to take on the whole waste problem by themselves; the responsibility to recycle everything lies with them. On the other hand the zero waste philosophy recognizes that communities cannot get rid of waste alone. They need industrial help in the form of industrial responsibility. We have to redesign the things that we currently can’t reuse, recycle or compost out of the manufacturing system” (Connett, 2013)

Zero waste confronts the idea of endless consumption without asserting accusation on the individual. The concept does not threaten those who are in the system of consumption; rather it challenges behavior in a positive way. The notion of zero waste has the potential to affect change from within the consumptive system (Motavalli, 2001).

Alongside the rise of ‘zero waste’ in the 1990’s, recycling efforts were increased, there was an upsurge of community reuse centers (such as our very own ReSource in Burlington), the need to fight overconsumption was initiated and composting began to grow. Zero waste can only be reached if each of these elements of the waste system is addressed simultaneously. In the words of Daniel Knapp “Discarded materials are not waste until they are wasted. Waste is a verb, not a noun” (Connett, 2013).

State Composting Rules and Regulations

Many states have regulations for composting facilities. There are similarities between regulations, however they differ from state to state. California has the most in-depth plan while Texas, Oregon, and Minnesota have general plans for their composting facilities.

California

Composting is widely recognized by states as a necessity for diverting biological waste (Kessler & Kessler, 2010; Zhang et al., 2012). California is one state that is working towards composting legislation that will divert organic waste from landfills. The California Integrated Waste Management Board (CIWMB) has a goal of 50 percent landfill diversion by 2020 (Berumen, 2009). In order to achieve this goal, the state of California is in charge of diverting 15 million tons of organic materials from the landfill. A recent statewide analysis showed that compostable organic materials make up approximately 25 percent of the solid waste being dumped in California landfills (Berumen, 2009). In the overall material landfilled, approximately 10 percent consists of lumber and 15 percent consists of food waste. The untreated lumber and food waste could be used together in the process of creating compost.

Several projects are being facilitated by CIWMB to support and expand diversion of organic waste from the landfill. Best Management Practices (BMP) for a compost utilization index allows the state to outline the best uses for compost materials. Some of these BMP's include the use of composted materials on agricultural crops and for erosion control (Berumen, 2009). Some of the other outlined uses of compost are runoff reduction and water quality (Berumen, 2009).

One of the major components of diverting organic waste from the landfill is the process of creating and complying with regulatory requirements. In order to clarify necessary permitting requirements for compost facilities, a Composting Operations Regulatory Requirements document was created for the state of California (Pedersen, 1995). This document outlines that only mixed solid waste composting facilities are required to obtain a full facility permit

(Pedersen, 1995). The state outlined a tier system to allow for a categorization of the levels of regulation throughout the state, such as the difference in regulatory intensity between a small composting operation and a commercial composting facility. This was created in order to provide consistency among compost facility managers and operators statewide (Pedersen, 1995).

The first tier includes the composting practices excluded from the need for a permit. This is comprised of backyard composting, storage of biomass feedstocks, and community composting of small scale. This also includes residential and industrial composting where the material is generated, composted, and reused on site (Pedersen, 1995). The second tier addresses composting sites that incorporate agricultural material into their operation. In this tier it is required for individuals to notify the local enforcement of what they are doing. In this tier you can sell or give away compost as long as it is only agricultural material (Pedersen, 1995). At this level, operators must use materials free from contaminants such as persistent organic pollutants (POPs), organic compounds that are resistant to environmental degradation as well as chemical fertilizers and pesticides that could alter the quality of the compost. The third tier requires registration for larger operations composting 1,000 to 10,000 cubic yards of materials collected from the mixed solid waste stream. Within this tier it is also mandated that the operator test for pathogen reduction and heavy metal content if selling more than 2,500 cubic yards of compost per year. The fourth tier is akin to the third, however it pertains to operations over 10,000 cubic yards of mixed solid waste. There are also local requirements that must be met as well as state regulations. The fifth and final tier pertains to municipal solid waste composting only (Pedersen, 1995).

Among other states, California's regulatory infrastructure is the most extensive. "Specific standards exist for siting and operating compost facilities. These include: Regular schedule of

site and feedstock inspections; Recordkeeping including public complaints, injuries etc; Feedstock quality control; Pathogen reduction; regular sampling protocol; finished product standards; and site closure plans” (Purman, 2008).

Colorado

In addition to California, Colorado is another state that has a noted regulation and permitting system for composting facilities. “Colorado has established a matrix of permitting requirements based on type and quantity of feedstock and type of business” (Purman, 2008). This is broken up into four classifications and three different types of feedstocks. The first type includes untreated wood wastes, source separated yard, paper and green wastes and agricultural crop residue. The second type includes food waste as well as animal material. Type three feedstocks are comprised of biosolids, solid waste, processed solid waste, and sludges. Within the three types there are four classifications that distinguish between feedstock types, quantities and purpose for composting (Purman, 2008).

Minnesota

Minnesota also has a regulatory process that notes the type of feedstock they process. The permits are allotted in two different ways. The first is to permit-by-rule which includes all yard waste facilities. This involves notifying the Minnesota Pollution Control Agency of the ownership, location, and proximity to the watershed of the state (Purman, 2008). Yard waste composters are also required to fill out a report indicating how much green waste went into the facility and how much product was sold or given away during the year. In addition a sample of finished compost is required per year for state testing (Purman, 2008). A facility must be

permitted as a municipal solid waste composting facility for all other compostable materials.

Even if the solid waste is not mixed, it is still regulated as such.

“ In addition, the states definition of ‘source separated’ includes the requirement that no material is considered source separated if it is co-collected with any other material. Commingling yard waste with food scraps and non-recyclable paper in a truck, by definition then, excludes both of them from being exempt from the 17 percent solid waste management tax”(Purman, 2008).

This means that yard trimmings and food scraps must be shipped to the same location in different trucks. This allows for the Minnesota municipal solid waste regulations to remain true. The composting regulations of facilities are very detailed. To name a few, the regulations include protection of surface and groundwater through the use of slope and retention ponds, composting must be anaerobic and in vessel, odor must be managed, requires plans and procedures for pathogen reduction, and only identified feedstocks can be accepted (Purman, 2008). The final step in the regulation process of Minnesota composting facilities is that a finished product sample must be tested before any is sold or distributed.

Oregon

In Oregon the Environmental Quality Commission implemented three sets of regulations on feedstock type and quantity obtained. This helped establish three permit categories: registration, general permit, and full permit. This ranges from the least strict (set A) of regulations to the strictest (set C). Set A “requires an odor minimization plan, mass balance calculation, water quality protection, operations and maintenance manual and records of incoming feedstock” (Purman, 2008). Set B regulations require a design of the features of the site, plan for the use of the end compost product, facility closure plan, and control of access to

site to name a few. Set B regulations are more strict than set A and set C reflect the most restrictions of regulation. Set C involves a plan for salvaging non-compostable materials and pathogen deduction in addition to meeting set A and B regulations.

Texas

In Texas, regulations are based on the type of feedstock and also use the tier method of regulating compost sites. A site is considered exempt if they process only manure, clean wood, source-separated yard trimmings, paper, or vegetable matter (Purman, 2008). If processing dairy, meat, fish, dead carcasses or meat/vegetable greases notification is required. Registration is required if composting sewage sludge, disposable diapers, and paper sludges. Finally, a permit is required for composting grease-trap waste and municipal solid waste. As the feedstock becomes more complex, the regulations become more strict.

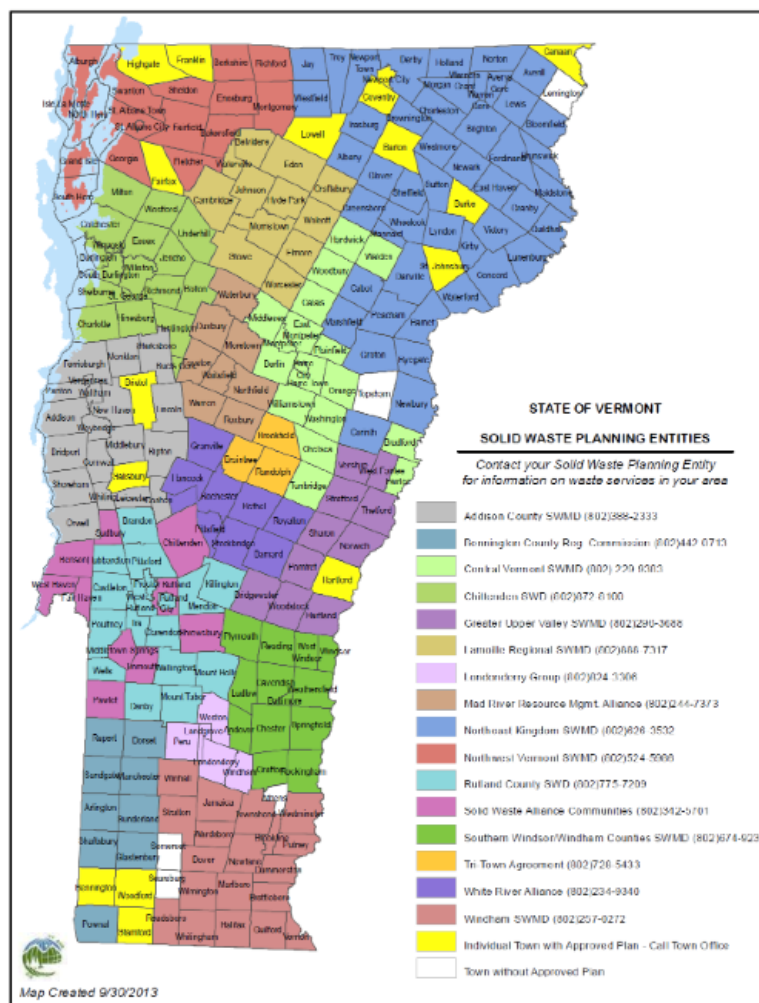
Vermont

In 1970, Act 250 was created as Vermont's Lands Use Law. It was formulated to minimize the environmental impacts of development. This Act was the main governing entity for composting facilities and land development prior to new enforcements from the Waste Management and Prevention Division of Vermont. New Act 250 rules were made effective October 1, 2013 by the Natural Resources Board (Natural Resources Board, n.d.).

In 1987, Act 78 was passed in Vermont to better manage solid waste. This Act is known as the Comprehensive Solid Waste Legislation. It led to the implementation of solid waste districts in Vermont. The Act placed responsibility on regions of Vermont to manage their waste efficiently and sustainably. Since the inception of the Act, landfills have been capped, recycling

rates have increased and waste is managed with increased proficiency (Crombie, 2007). The Act outlined a regional planning process for the purpose of regional integrated solid waste systems. After full implementation of Act 78, there were six solid waste management districts. Today there are ten solid waste management districts in Vermont and three inter-municipal organizations that are active in the management of solid waste in their regions (Crombie, 2007). Since the implementation of Act 78, the public sector has developed infrastructure for household recycling, composting, hazardous waste disposal, and transfer of solid waste to regional landfills.

APPENDIX B: Map of Solid Waste Management Entities



<http://www.anr.state.vt.us/dec/wastediv/solid/pubs/VTswmgmtPlan.pdf>

In 1989, there were fourteen privately owned landfills and fifty municipal landfills in Vermont. Today there is only one landfill that is still open in Coventry, Vermont. The landfill is privately owned, as are increasing numbers of solid waste management facilities in Vermont. In 1987, there were an estimated 500 licensed haulers and, as of 2006, the number had decreased to 277 licensed haulers. A small portion of waste management companies operate the majority of the collection and transport infrastructure. In addition, municipal solid waste districts utilize private sector services and/or facilities to comply with mandates and responsibilities (Agency of Natural Resources, 2006). The consolidation of the waste industry in Vermont has led to the private sector playing a significant role in solid waste management.

FIGURE 4 - MSW COLLECTED BY TYPE OF ENTITY (1)

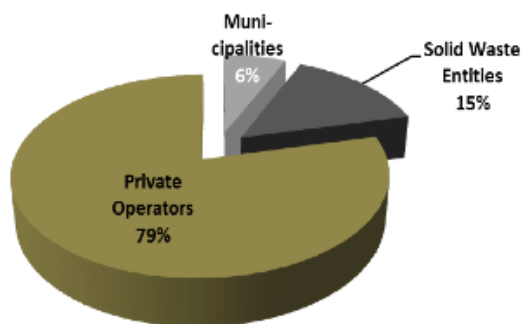
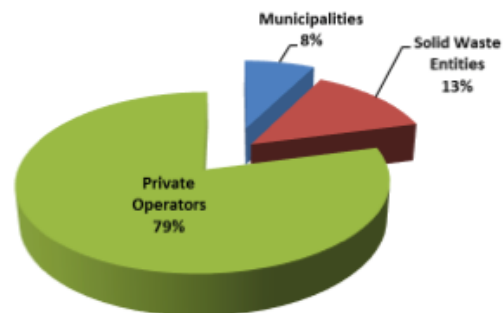


FIGURE 5 – RECYCLING BY TYPE OF ENTITY (2), (3)



FIGURES 4 AND 5 NOTES:

(1) Based on reported 2011 MSW tonnage collected at certified facilities.

(2) Based on reported 2011 Recycling tonnage (fibers, containers and commingled materials) collected at certified facilities.

<http://www.anr.state.vt.us/dec/wastediv/solid/pubs/VTSWMgmtPlan.pdf>

Vermont currently has twenty-one procedures in effect that address issues of solid waste. They were recently revised in 2012 to update procedures that were not as stringent as they should be. Out of these procedures, two are dedicated to regulating composting in Vermont. The first outlines approved feedstocks for facilities operating under Acceptable Composting Practices (ACPs) . Acceptable Composting Practices are standards that every composting facility must meet including no impact to surface or groundwater and no off-site nuisance. The approved feedstocks include pre- and post-consumer food residuals, high carbon bulking agents, waste silage, leaf and yard waste, and farm waste, excluding liquid manure (Waste Management Division, 2012a).

The second procedure defines high carbon bulking agents used in composting. Bulking agents were mentioned in the first procedure as an approved feedstock. They are used to increase aeration in the composting process and balance nitrogen levels. The ideal ratio of nitrogen to carbon in a composting pile is 1:30 (N:C). In 2008, Act 130 was passed to amend the statutory definition of solid waste to exclude high carbon bulking agents used in composting. The new procedure created in 2012 outlines a list of high carbon feedstocks exempt from Act 130. The list includes clean wood chips/shavings, bark wood chips, straw, shelled corn cobs, corn stalks, shrub trimmings, clean dry leaves, coarse sawdust, nut shells, pine needles (brown), non-legume hay (dry), heavily-bedded horse manure, and paper or paper products (as approved by the Solid Waste Management Program) (Waste Management Division, 2012b).

In addition to the procedures outlined by the Waste Management and Prevention Division of Vermont, there is a set of Solid Waste Management Rules. Within these rules, there is a subsection on Organics Management that pertains to composting in Vermont. It is broken down into a long list of categories that concern small, medium, and large composting facilities. The

categories are as follows: certification exemptions, accepted practices for small composting facilities, medium scale categorical composting facility certifications, large composting facilities, siting and prohibited areas for medium and large composting facilities, liquids management standards for medium and large compost facilities, recordkeeping and reporting requirements for medium and large compost facilities, management of food and food processing residuals at medium and large composting facilities, standards for animal burial categorical certifications, standards for animal mortality composting, and anaerobic solid waste digesters (State of Vermont, Agency of Natural Resources, & Department of Environmental Conservation, 2012).

Compost Facility Sites

One of the major benefits of compost as an end product is that it creates healthier soils. As soils become naturally nutrient rich, they are better able to retain water. This helps detract from runoff issues in the state of Vermont (Composting Association of Vermont, 2008). Healthier soils can better withstand erosion, reducing the amount of nutrients that get washed into waterways. Reducing the impact of nutrient runoff into waterways through building better soils will also help the health of Lake Champlain. Through good site design, composting facilities are able to use the soil they create to make sure they do not contribute to runoff and nutrient leaching.

The Agency of Natural Resources has a list of compost certification requirements. Small composting facilities must operate on less than four acres of land, not including finished compost storage areas or storm-water management. Small composting facilities can manage a maximum of 5,000 cubic yards per year of feedstocks including no more than 2,000 cubic yards of food residuals and food processing residuals. A medium sized composting facility has to use less than

ten acres of land, not including finished compost storage areas or water management. Medium composting facilities can compost a maximum of 40,000 cubic yards per year including 5,000 cubic yards per year of food residuals and ten tons per month of animal, offal, or butcher waste. A large compost facility is required to get full certification for an area greater than ten acres or if it does not qualify for medium facility certification. A large composting facility certification is for over 40,000 cubic yards per year, or less than 40,000 total, but more than 5,000 cubic yards per year of food residuals or greater than ten tons of offal or butcher waste. Medium and large composting facilities may need to acquire Act 250 approval (Agency of Natural Resources,

SUMMARY OF COMPOST CERT REQUIREMENTS (based on 3/15/12 VTSMWR)



4 LEVELS OF REGULATION			
EXEMPT ¹	SMALL (Registration Required)	MEDIUM (Cat Compost)	LARGE (Full Cert)
Composting < 100cy/yr any feedstocks	Compost management area must be <4 acres (does not include finished compost storage areas or leachate/stormwater mgmt. areas)	Compost management area must be <10 acres (does not include finished compost storage areas or leachate/stormwater mgmt. areas)	Compost management area >10acres, or do not qualify for medium (does not include finished compost storage areas or leachate/stormwater mgmt. areas)
Managing <3000 cy/yr leaf/yard/plant/wood & <20% is grass	Composting <5000 cy/yr feedstocks, Including not >2000 cy food residuals/food processing residuals. No animal mortalities, slaughterhouse waste, or offal.	Compost <40,000 cy/yr, Including not >5000cy/yr food residuals/food processing residuals. Including not>10 tons/month animal, offal, or butcher waste	Compost >40,000 cy/yr, or <40,000 total but >5000 cy/yr food residuals/food processing residuals, or >10 tons/month animal, offal, or butcher waste
Managing food residuals in a digester and <1% of design capacity is food	Compost <10,000 cy/yr of solely leaf, yard & untreated wood residuals	Or composting >10,000cy/yr of leaf & yard waste	
Composting only manure, bedding, & clean carbon bulking agent	Not eligible for "small" if exempt from Act 250 under 10 VSA §6001(3)(D)(vii)(VI) [The compost is produced on a farm primarily used for the cultivation or growing of food, fibre, horticultural, or orchard crops] Note exemption expires 7/1/14.	May require Act 250 approval	May require Act 250 approval
Composting vegetative farm waste on a farm from any farm			
Composting <1000 cy/yr food processing residuals on a farm		NOTE: Composting any amount of sewage sludge, domestic septage, or septage is regulated as diffuse disposal	
Composting animal mortalities & slaughterhouse waste from a farm on the farm			

2012).

TABLE 32. ALLOCATION OF ORGANICS PROCESSING CAPACITY BY SIZE AND COUNTY

25,000 Tons Per Year:	Chittenden County - 21,000 tpy
10,000 Tons Per Year:	Franklin County – 6,500 tpy Rutland County – 8,500 tpy Washington County – 8,000 tpy Windham County – 6,000 tpy Windsor County – 7,700 tpy
5,000 Tons Per Year:	Addison County – 5,000 tpy Bennington County – 5,000 tpy Caledonia County – 4,000 tpy Lamoille County – 3,000 tpy Orange County – 4,000 tpy Orleans County – 3,500 tpy
1,000 Tons Per Year	Essex County – 900 tpy Grand Isle County – 900 tpy

http://www.anr.state.vt.us/dec/wastediv/solid/documents/FinalReport_Act148_DSM_10_21_2013.pdf

Act 250 was established in 1970 as the first development and control law. “The law provides a public, quasi-judicial process for reviewing and managing the environmental, social and fiscal consequences of major subdivisions and development in Vermont through the issuance of land use permits” (“Act 250 ”, 2010). The Act 250 permits are mandatory for “commercial or industrial purposes on more than 10 acres.” There are 11 elements to the criteria for jurisdiction that describe entities that must acquire an Act 250 permit (“Act 250 ”, 2010).

Act 148

Act 148, or the Universal Recycling Law, was developed and passed into law to help Vermont move closer to its zero waste goals. The greatest influence leading to the establishment of Act 148 was the rate of waste diversion (30 percent to 36 percent) in Vermont. The Act works towards a goal of capturing and diverting valuable waste from the landfill. It is focused on achieving diversion of recyclables, food scraps and leaf and yard debris, supplying parallel collection of these materials at the same location, and providing incentives for diversion through the use of variable rate pricing (Agency of Natural Resources, 2013). The Act works to provide consistent composting and hauling services to Vermont residents.

The separation of waste, recycling, and organics mandated by the Act creates an incentive for investment in materials management strategies in Vermont. The incentive is created by the cost associated with the requirements of the Act (Agency of Natural Resources, 2013). During the 2011-2012 legislative session, it was recognized that there was an increasing need for waste diversion from landfills. Some of the stakeholders involved during the decision-making were the Agency of Natural Resources, solid waste districts, alliances and municipalities, private haulers, owners and developers of organics management facilities (including farms), and business and household generators of waste, recyclables and organics. The EPA did a recent study that found that the average state recycles approximately 35 percent of their waste. Vermont recycles 36 percent of waste; however, lawmakers found this percentage to be inadequate (Gram, 2012). The legislators decided on Act 148 in order to divert waste materials and provide a detailed analysis of the current waste stream. The Act also includes education of the public and bans on certain materials such as clean organic waste and mandated recyclables (cans, bottles etc.), from entering Vermont landfills (Recycling Bill Outline, 2012).

The Act uses a phased approach to allow for infrastructure development and facility preparation. By 2016, leaf and yard residuals will be banned from trash disposal and in 2020 food residuals will be prohibited from landfills. Leaf and yard residuals collection will be mandated by 2015 for facilities and by 2016 for haulers. In 2020, it will then become obligatory for haulers and facilities to collect food residuals. The requirements of the Act are phased in over a nine-year span from 2014 to 2022.

APPENDIX A: Timeline of Act 148 Implementation Dates



Universal Recycling TIMELINE

JULY 1 2014	<ul style="list-style-type: none"> Transfer stations/Drop-off Facilities must accept residential recyclables at no extra charge Food scrap generators of 104 tons/year (2 tons/week) must divert material to any certified facility within 20 miles
JULY 1 2015	<ul style="list-style-type: none"> Statewide unit based pricing takes effect, requiring residential trash charges be based on volume or weight Recyclables are banned from the landfill Transfer stations/Drop-off Facilities must accept leaf and yard debris Haulers must offer residential recycling collection at no extra charge Public buildings must provide recycling containers alongside all trash containers in public spaces (exception for restrooms) Food scrap generators of 52 tons/year (1 ton/week) must divert material to any certified facility within 20 miles
JULY 1 2016	<ul style="list-style-type: none"> Leaf, yard, and clean wood debris are banned from the landfill Haulers must offer leaf and yard debris collection Food scrap generators of 26 tons/year (1/2 ton/week) must divert material to any certified facility within 20 miles
JULY 1 2017	<ul style="list-style-type: none"> Transfer stations/Drop-off Facilities must accept food scraps Haulers must offer food scrap collection Food scrap generators of 18 tons/year (1/3 ton/week) must divert material to any certified facility within 20 miles
JULY 1 2020	<ul style="list-style-type: none"> Food scraps are banned from the landfill

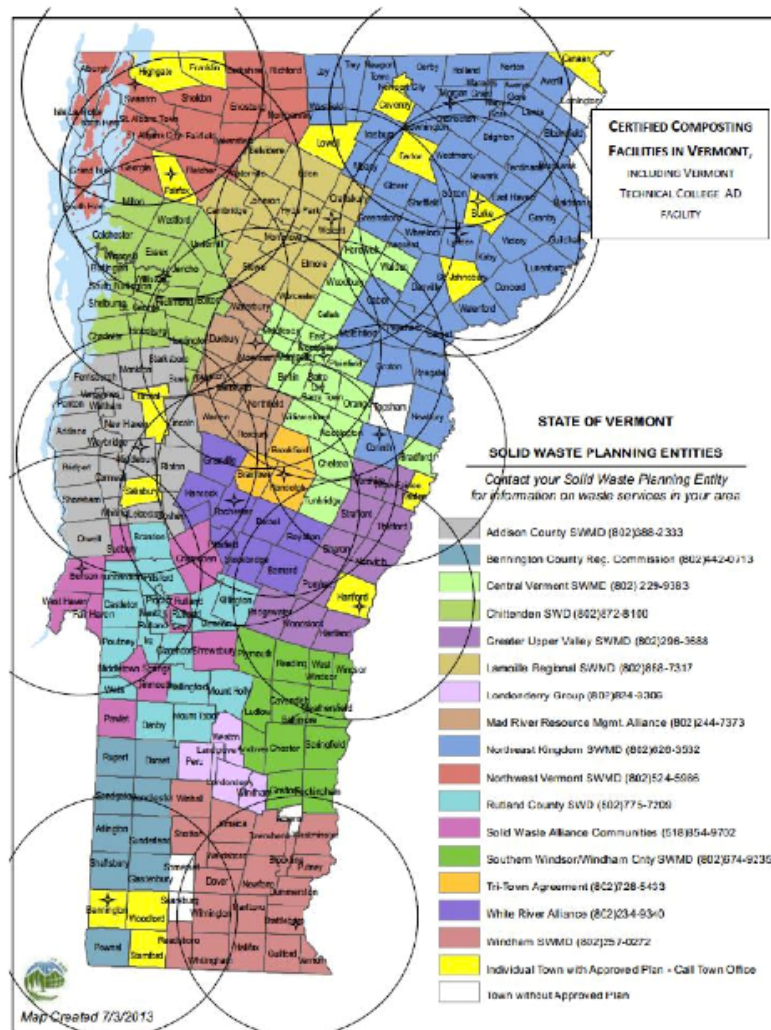
(<http://www.anr.state.vt.us/dec/wastediv/solid/pubs/VTSWMgmtPlan.pdf>)

This allows for two full years of implementation of the changes in solid waste management practices from the final phase of full implementation of source separation requirements (DSM Environmental Services, Tellus Institute, & Robert L. Spencer, 2013).

“The recyclable materials required to be separated are: mandated recyclables, leaf and yard residuals, and food residuals. Mandated recyclables – source separated, traditional recyclable materials, such as cans, glass bottles, plastic containers, cardboard, and newspaper. Leaf and yard residuals are defined as source-separated, compostable untreated vegetative matter. Food residuals are defined as source-separated, compostable material derived from the processing or discarding of food.” (Londonderry News, 2012)

Furthermore, it will be mandated that larger generators of food waste (schools, hospitals, universities) begin diverting food residuals if there is a facility within twenty miles of them. This is another phase-in mandate that will start in 2014 with generators that produce more than 104 tons per year of food residuals.

FIGURE 9. CERTIFIED COMPOSTING FACILITIES, AND 20 MILE RADIUS⁶⁶



(<http://www.anr.state.vt.us/dec/wastediv/solid/pubs/VTSWMDgmtPlan.pdf>)

Finally, in 2017 with the mandate of generators that produce more than 18 tons per year of food residuals. Coupled with the mandated collection of organic refuse by facilities and haulers, 2020 will be the year that Act 148 is enacted fully (Jamieson, 2013).

Act 148 is a part of the healthy future of Vermont. Landfill space in Vermont is limited and Coventry landfill is nearing capacity. Rather than organic solid waste or recyclable materials going into a landfill, they should be diverted into a closed cycle of feeding the soil and becoming new products respectively (Act 148, 2012).

The Goal

The main goal of Act 148 is to divert refuse from Vermont landfills. Diverting waste materials for further use such as recycling or composting conserves resources while reducing energy consumption and greenhouse gas emissions (Act 148, 2012). The goal of widespread composting infrastructure is to rethink how individuals, communities, and the state manage the organic waste generated (Composting Association of Vermont, 2008). The legislation of Act 148 will bring organics diversion and the local food system together. Because the hierarchy of diversion outlined in Act 148, organic waste will have to be diverted from the source first before composting. Connecting grocery stores with food shelves and farms will increase organic waste diversion from the landfill to the consumption of humans and animals. The connectivity of the organic waste stream and efficiently distributing local food will be critical to achieving Act 148 goals. This is extremely important in the state of Vermont as there is an emphasis on food systems (BioCycle, 2012). This Act is the most significant change to solid waste law in Vermont since 1988. It has been approved by legislature unanimously.

One of the main goals of the Act is to provide more consistent services statewide through providing convenience, choice, and incentives (Jamieson, 2013). The goals of the Act run parallel with a hierarchy for mandating diversion of organic waste from the landfill. This hierarchy is to first reduce the production of waste at the source, then to divert the edible food for human consumption, then to give the food residuals to animal feed, to compost, use as land application or bio digesters, and lastly to divert to biofuel or energy recovery (Jamieson, 2013; Recycling Bill Outline, 2012). Paul Connet in *The Zero Waste Solution* supports this in his own prioritized list of factors involved in handling waste. His list is very similar as shown here:

1. Feeding humans using in-time marketing of food items close to their sell-by dates from supermarkets, as well as unused food from restaurant kitchens
2. Feeding animals
3. Home composting or vermiculture¹
4. Community composting or vermiculture
5. Small-scale in-vessel composting systems in urban areas
6. Co-composting with agricultural waste in rural areas
7. Centralized composting or anaerobic digestion in rural areas

The Act is focused on minimizing reliance on landfilling. Disposing of valuable materials such as recyclables and organic waste is an indication of an inefficient management system. Although landfills are understood as being environmentally irresponsible, Vermonters continue to throw away over 400,000 tons of material each year (Agency of Natural Resources, 2013). The food recovery hierarchy was created roughly 25 years ago and still has not significantly impacted the reduction in valuable waste disposal.

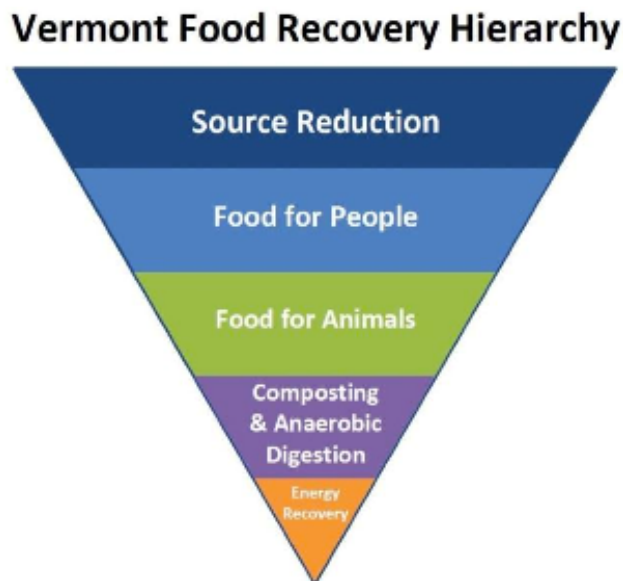


Figure 3. Vermont's food recovery hierarchy.

http://www.anr.state.vt.us/dec/wastediv/solid/documents/FinalReport_Act148_DSM_10_21_2013.pdf

¹ Compost done using worms to breakdown food residuals.

The Problems with Act 148

Although Act 148 contains a detailed analysis to increase the diversion of organic waste from landfills, there are aspects of it that present problems. Currently in Vermont, the infrastructure is only at fifteen percent of the capacity required to meet the needs of organic waste diversion in Vermont. In order to meet the goal, there must be a major effort to divert organic waste from the waste stream at the point of consumption and production (Rubenstein, 2013). The lack in critical infrastructure such as organic management facilities and collection and hauling services is a major problem to the implementation process of Act 148. It is projected by the Systems Analysis that when Act 148 takes effect, Vermont will need to process 43,662 tons of organics per year. The current processing capacity of composting facilities and animal feeding is approximately 22,000 – 35,000 tons per year (Agency of Natural Resources, 2013).

One barrier to increasing organic waste diversion is outlined as the “Ick” factor by the Materials Management Plan. This addresses the issues involved in storing food scraps for composting onsite or for collection and hauling to organics management facilities. These facilities include farms, composting facilities, or anaerobic digestion facilities (Agency of Natural Resources, 2013). In order to address the “Ick” factor, education and outreach will have to inform hauling services on how to mitigate odors, avoid attracting pests, and prevent contamination of food residuals. The waste haulers will be able to save costs on hauling trash due to the decreased weight, thus making tipping fees more affordable. This could create an avenue for haulers and waste generators to renegotiate their contracts (Agency of Natural Resources, 2013).

Another problem is transportation and separation of waste. The solid waste management system is officiated by two major groups, private businesses and public entities. Private

businesses currently manage fifty-eight percent of residential solid waste and recyclables as well as the overwhelming bulk of commercial solid waste. They also own and/or operate the majority of the large transfer stations and nearly all of the landfill capacity in Vermont (DSM Environmental Services et al., 2013). Furthermore, public entities are regional solid waste districts, alliances and individual municipalities. Public entities maintain many of the “special waste collection systems, provide on-going education and promotion of recycling and special waste management, and operate many smaller transfer stations and drop-offs” (DSM Environmental Services et al., 2013). Through the implementation of Act 148 parallel curbside collection will be required of haulers who offer services for trash. Haulers offering trash pickup will have to offer recyclables pick up by July 1, 2015, leaf and yard debris by July 1, 2016 and food scraps by July 1, 2017 (Agency of Natural Resources, n.d.).

Timeline for Haulers



http://www.anr.state.vt.us/dec/wastediv/solid/documents/FinalReport_Act148_DSM_10_21_2013.pdf

Act 148 is an unfunded mandate by the state. This means that haulers are mandated by the Act to follow a certain criteria but will not receive any financial funding to aid in accomplishing the new guidelines (DSM Environmental Services et al., 2013). The creation of a financial burden on haulers articulates another barrier to implementation. The Act may prove to be too expensive for independent haulers without a source of funding (Rubenstein, 2013). If a solid waste facility offers the collection of solid waste, they aren't allowed to charge a separate fee for the collection of mandated recyclables under Act 148. Facilities may charge commercial haulers for the collection of mandated recyclables. In addition, a hauler that offers the collection of solid waste cannot charge a separate fee for collecting mandated recyclables, but is permitted to charge a fee for each service call in a residential area (Rubenstein, 2013).

The current cost of Vermont's solid waste management system is estimated to be \$1.36 billion over the nine-year period from 2014 to 2022. This translates into an annual average of \$150 million. As stated in a the final report for the ANR, "Act 148 has the potential to increase recyclable materials recovery rates to between 63 and 68 percent and divert roughly 60 percent of food and yard residuals, and compostable paper, currently going to landfill" (DSM Environmental Services et al., 2013). To achieve the higher recovery and diversion rates, the bottle bill will have to remain, or be expanded over the existing system. Through the nine year span of phases, the Act will increase the cost of solid waste management for Vermonters across the state (DSM Environmental Services et al., 2013). Overall, the major costs will reside with the users of the system who will pay higher monthly fees for pickup services and the haulers that are expected to invest in new equipment as they improve their capacity to provide new services. It is estimated that the total capital investment of the nine-year implementation period will be between \$42-\$45 million. The bulk of this estimated cost is due to the need for capital

investment in new organics processing facilities to meet the capacity necessary for the increased diversion of food residuals and other organics (DSM Environmental Services et al., 2013).

Another primary concern of implementation is how mandated separate collection of recyclables will be enforced. It is stated in the ANR final report that this “is relatively easy if municipalities and solid waste districts are willing to provide recycling drop-off adjacent to the transfer/disposal location at no cost as well as adopt and enforce ordinances requiring separation” (DSM Environmental Services et al., 2013). Enforcement at sizable private transfer stations and of subscription collection by households (representing 58 percent of all households) presents a challenge. With a lacking enforcement system, private haulers that do not require source separation of recyclables will be able to charge a smaller fee creating an unbeatable competition for those haulers that rigorously enforce mandated source separation of recyclables. This issue will take a prominent place in the implementation of the Act unless this is enforced at the point of transfer or disposal (DSM Environmental Services et al., 2013).

Vermont Agency of Natural Resources (ANR)

The Vermont Agency of Natural Resources has been given the responsibility to oversee the transition to Act 148 and to keep track of the process over time. Their mission statement is,

“To draw from and build upon Vermonters’ shared ethic of responsibility for our natural environment, an ethic that encompasses a sense of place, community and quality of life, and understanding that we are an integral part of the environment and that we must all be responsible stewards for this and future generations” (ANR, 2013).

Act 148 requires the ANR to readopt the state solid waste management plan. It also adds priorities that the solid waste plan is required to promote. This includes materials management, closed loop recycling, and reduction of reliance on disposal of waste (Londonderry News, 2012).

Through the Act, the ANR is required to do an assessment of solid waste management and waste analysis, which was finished in 2013. They are also required to report to the legislature every two years on the status of solid waste and packaging in Vermont. In addition, they are required to submit a report to the legislature and conduct an evaluation of the cost/benefit of expansion of the beverage deposit redemption program and single stream recycling (Act 148, 2012).

Materials Management Plan

The materials management plan outlines the importance of diverting valuable waste from the landfill and provides a plan to achieve an increased diversion rate to meet Act 148 requirements. The plan includes Solid Waste Management Entity-level Standards that require that municipal solid waste entities work to increase education and outreach with their communities. It proposes that municipal entities work with schools to implement waste reduction programs including recyclables and organics. The Solid Waste Management Entity (SWME) will work with 20% of schools in their jurisdiction each year. This part of the plan allows for all schools within the jurisdiction of each SWME to be reached by the end of term of the Act. SWME's must also implement an ongoing public outreach campaign to inform businesses and residents of the best management practices for organic refuse. The plan emphasizes a prioritized outreach to larger food waste generators. SWME's are required to "conduct outreach to 10% of food based businesses within their jurisdiction each year, ensuring that at a minimum, 50% of businesses are reached by the end of the Plan term" (Agency of Natural Resources, 2013). In addition, 20% of local food redistribution groups and networks must be in collaboration with SWME's each year in order to work in line with the waste diversion hierarchy. SWME's must also provide collection of organics if there is no organic waste collection entity within their

jurisdiction. The organics collection enterprise can be privately owned, however if they go out of business or cease to exist, the SWME must provide a collection service.

In the Materials Management Plan (MMP), organics are addressed as a “material derived from living organisms such as leaf and yard debris, food scraps, clean wood and paper and paperboard products” (Agency of Natural Resources, 2013). It was found that 28% of residential waste 18% of industrial, commercial and institutional (ICI) is organic. Increased organics diversion can be achieved through “source reduction, donation and diversion through composting and anaerobic digestion” (Agency of Natural Resources, 2013). The MMP includes the education and outreach that the ANR will be providing. ANR will collaborate with groups and agencies in Vermont to successfully provide education and outreach. Some of the groups they will be working with are School Board Association, the Vermont Superintendents Association, the Vermont Principles Association, the Vermont Agency of Education, and Vermont State Colleges. The Agency of Natural Resources will also be working to inform the commercial sector about the benefits of food waste reduction. SWME’s will be aiding in the education process by targeting organic waste generators, haulers, processors and end-users.

Another part of the MMP is to extend producer responsibility and product stewardship. Extended Producer Responsibility (EPR) must be approached with a unique strategy when addressing organic waste. The difficulty lies in the variable ways in which organic materials are generated and distributed. However it is outlined that source reduction, redistribution and diversion are approaches to reaching responsible management of organic waste (Agency of Natural Resources, 2013). Through the outreach process, ANR will be promoting the “State Offices Organics Program.” The three-part approach to the program includes education of state employees on the basic importance of diverting organic waste from the landfill, state and local

government buildings will divert all organics from their waste stream by the end of the Plan term and ANR will encourage Vermont agencies to use Vermont produced compost in landscaping and applications such as grounds, road easements and medians. In addition to this approach ANR will develop a web-based, interactive map of food residual producers and facilities certified to manage organic materials. This will help organic waste generators connect with compost facilities that can aid in meeting Act 148 requirements (Agency of Natural Resources, 2013).

Another section to the MMP for organics is infrastructure improvements. In order to achieve increased organics diversion, new infrastructure will have to be implemented. Making the diversion of organic waste convenient will be a major factor in participation rates. Many areas in Vermont are without an organics management facility nearby. A centralized organics management facility is needed to process residential organic material in each region of Vermont.

Vermont Waste Haulers

Act 148 requires trash haulers to offer parallel services of recycling and organic waste pick up by 2017. Parallel collection means that along with trash pickup, haulers must offer organic waste and recycling pick up. The requirements of collection services pertain to two groups; facility owners that offer trash collection and private haulers that offer curbside trash management services. The phased in mandates are as follows (Agency of Natural Resources, n.d. ; DSM Environmental Services et al., 2013).

- Parallel collection by facilities:
 - Recyclables by July 1, 2014
 - Leaf and yard debris by July 1, 2015
 - Food scraps by July 1, 2017
- Parallel collection by private hauling entities
 - Recyclables by July 1, 2015
 - Leaf and yard debris by July 1, 2016
 - Food scraps by July 1, 2017

Private haulers can embed the cost of recycling pickup in the trash pick up fee, however they cannot charge separately for it. They are able to charge a separate fee for collection of yard debris and food scraps. Facilities who offer collection services cannot charge a separate fee for collection of residential recyclables but are able to charge private haulers for recycling drop offs and can charge a separate collection fee for collection of leaf and yard debris and food scraps.

Because of the requirement to offer parallel collection, trash haulers and facilities will have to invest in new equipment/infrastructure or subcontract hauling business to pre-existing organic waste haulers.



<http://www.anr.state.vt.us/dec/wastediv/solid/URHaulers.htm>

The cost of the new investment will then be reflected onto the cost of organic waste pick up for those that subscribe to collection services. The total capital investments for haulers and facilities in the state are estimated at \$42- \$45 million over the total implementation period (DSM Environmental Services et al., 2013). Over the nine-year span, this averages to be \$5 million per year. Much of the investment money will be going to organics processing capacity vital to increasing diversion of food residuals and other organics. However, this financial headache may be dissuaded by the decreased need for weekly trash pickup. With the source separation of organics mandatory, weekly trash pick up will not be necessary. There will be less trash and it will smell less due to the removal of food residuals. This reduction in necessary trash pick up will allow more money to be put towards organic waste pick up services. However, the mandatory separation of organic waste will cost each individual household an additional \$7-\$9 per month (DSM Environmental Services et al., 2013).

The major impact on the hauling community will be in areas of Vermont where subscription curbside recycling and organics pickup are uncommon. The requirements of the Act will also have a greater impact on haulers that do not currently offer recycling services. Act 148 requirements are uniform across the state influencing DSM Environmental to suggest “consideration should be given to a careful analysis of the potential to consolidate district administration and recycling education across the state.” This would provide the benefit of a level playing field and reduced costs for generators and haulers implementing consistent messaging and organics diversion requirements (DSM Environmental Services et al., 2013).

Another issue facing haulers is the reduction in revenue from decreased amounts of refuse going to the landfill. Although reduced trash pickup will be beneficial to haulers through the reduction in infrastructure needs and gas costs, dumping at the landfill creates a monetary

source for municipalities and districts. Private haulers, (who do not receive support from the landfill tipping fees) municipalities and districts will have to stay afloat financially by deciding which system costs they will include in the unit based pricing for refuse. Dispersing the cost of organics and recycling pick up through the fee associated with refuse pick up in addition to a separate yard and food residual pickup fee will be one way for haulers to meet costs. However, with the collection of organic waste, costs have the potential to increase further. If haulers decide to move to every other week collection of refuse and recycling, with a weekly collection service for organics, costs may be reduced. Through an understanding reached by DSM Environmental it is assumed that 25 percent of the organics will be collected in roll-offs, 25 percent in dumpsters, and 50 percent in rolling carts serviced by rear-loading compaction trucks (DSM Environmental Services et al., 2013).

Over the implementation period of Act 148, the amount of refuse disposed of will be reduced by approximately 30 percent. This is due to the parallel services of organics diversion and recycling pick up services. The reduction in disposal of waste will translate into a reduction in revenue for the municipalities and districts in Vermont. Surcharges from waste disposal at the landfill have been going to these entities for many years and will no longer be a substantial source of financial support as Act 148 decreases the amount of refuses dumped at the landfill. In addition, haulers will no longer be receiving revenue from bag or cart-based fees and will have to absorb the cost of refuse and parallel recycling in their unit based price for collection services. Unit based price is a fee connected to a single container collection service (DSM Environmental Services et al., 2013).

METHODOLOGY

Thesis Conception

The conception of my thesis work started with my desire to do something for the greater community of Vermont. When starting the thesis process I decided that I wanted to do research that would benefit the state that I have grown to call home. I wanted to use my educational process as a way to reach out and have a positive impact on Vermont. Initially I was working towards a thesis involving design and community development, however in the middle of my preliminary thesis class, I received an email regarding Act 148 research needs. Although I did not address the exact research needs expressed in the email, I took the opportunity to educate myself on Act 148 and find where my interests overlapped with the research needs of the Act. My niche within the Act developed as I continued to read about the Act and its requirements of different entities around the state. I became aware of the increase in organic waste and the problems this presented to existing infrastructure. After continuing the research process I learned that the majority of the pressure would be on Vermont haulers and composters to achieve the goals of the Act.

My research objectives continued to evolve as I spoke with my advisors and Josh Kelly at the Agency of Natural Resources. By continually having conversations about the Act from those who are aware of both the implementation process and the waste stream of Vermont, I was able to understand where my educational experience could create the greatest awareness. As an Environmental Studies major at the University of Vermont I have felt the most fulfilled by classes that create change. For example service-learning courses at the UVM have allowed me to create connections and do meaningful work with community members through the process of learning. Pairing my preference for an educational experience with hands-on community work

with my interest in the sustainability of the Vermont landscape, doing research on Act 148 was a perfect opportunity.

My interest in composting came from a basic understanding of closed loop systems and zero waste communities. I was required to do a research paper for a permaculture certification course and took the opportunity to dive deeper into the processes of composting and its historical implications. This research paper led me to understand the importance of composting and the lack thereof in western waste systems. Waste is often something that we sweep under the hypothetical carpet to be dealt with by someone else, however the state of Vermont is taking the opportunity to unveil the process and create a mentality of accountability. Act 148 does this by requiring that residents, businesses and all other establishments in the state of Vermont divert their organic waste from the landfill by 2020. I was interested in understanding how this attitude of statewide accountability would affect those that would physically be dealing with the organic waste.

As the foundation of my understanding of Act 148 developed, I was able to reflect on the greater importance of my thesis research topic. In the set up of today's Western society we are programmed to dispel of waste and forget about it. However, our waste ends up somewhere, often effecting the environment in negative ways. Organic waste, meaning anything that is compostable that we dispose of, is an opportunity and a resource waiting to be tapped into. The implementation of Act 148 allows the state of Vermont to use organic waste as a resource and create a new paradigm around waste. The food we eat, the landscape and we, ourselves, are all a part of the soil. Understanding the organic waste stream as an opportunity has the potential to change the way we think about waste in general. Vermont has promise to be a revolutionary leader in the waste industry due to Act 148. Act 148 provides a case study for a new way of

using and understanding waste. It is a dynamic time for the state of Vermont that may allow the state to emerge as an even stronger progressive leader in the Country. The conception of my thesis research started with a statewide need to understand the affects this Act will have on haulers and composters, however, it is also important in changing paradigms surrounding the waste stream.

Choosing Methodology

In order to gather information regarding the effects of Act 148 on waste haulers and compost facility managers/owners across the state, I used interviews. Rather than using surveys or questionnaires, creating semi-structured interviews allowed me to connect with the individuals I interviewed. In order to achieve the information that would result in a greater understanding of the effects of Act 148, I wanted to speak with individuals in person. This choice of methodology directly resulted from my research objectives which were to understand what compost mangers/owners and waste haulers in the state of Vermont think about Act 148, how it will affect their operation and any future consequences they foresee. Another objective was to obtain quantitative information pertaining to the amount of waste flowing between hauling and composting in Vermont. I also wanted to capture new innovations and thoughts that may not have a greater voice in the conversation of how to move forward with Act 148. After understanding all of the options of obtaining information, interviewing became the obvious method of choice for my research objectives. I was able to reach emotional answers from the interviewees due to the personal nature of a one-on-one interview.

Within Act 148 there is disparity between how connected each waste hauler and compost facility manager/owner is from the state, meaning that some people are very connected with the

implementation process of the law and what it means for their business. Some of these individuals are aware of the changes that they will need to make in their businesses and some are not. There is also a wide range of individuals who are involved in waste hauling and composting in Vermont. Within the industry there are people of all different backgrounds and professional experience. Another objective was to show a fully encompassing picture of the Vermont waste stream by contacting and interviewing individuals invested in different waste components. By doing person-to-person interviews I was able to capture a full understanding of the individuals involved. Not only was I able to put a face to the name, I was able to connect with the ideals and mentality of these individuals that provoked me to ask deeper questions based on their responses.

I chose to do semi-structured interviews in order to create space for topics that my questions had not directly addressed. I used the same core sets of questions for all of the interviews. I devised two sets of interview questions, one for waste haulers and one for compost facility managers/owners. The semi structured style of the interviews allowed me to add questions and skip questions that had already been adequately answered without me asking them. I was able to let my personal connection and understanding of the interviewee direct the interview, while using my question structure as a reference. The questions I generated allowed the interviews to stay on track while achieving answers to compile and code in my research results. While the semi structured interview style created an open flow of communication it also produced disparity in results. For example, the way that I asked one question in one interview may be different from the way I asked the same question with a follow up probing question in another interview. Therefore, asking the same question with layering probes may elicit different interpretations of the question and therefore a different way of answering the question. This could be interpreted as a beneficial aspect of an informal interview or it could skew results. This

was an intentional part of choosing to do semi-formal interviews as I was hoping to explore many different opinions and ideas that have been formed on Act 148 and the waste stream of Vermont.

Interview Questions

I designed two sets of questions for the interview process, one for the hauling community and one for the composting community. While the sets of questions were similar, the interview questions for the waste haulers were focused on how they currently conduct hauling, whether or not they do residential organics pick up and understanding the what the impacts on hauling operations are in the state of Vermont. Interview questions pertained to the organic waste stream and the benefits/issues of increased organics in the waste stream. The interview questions for the compost managers/owners were focused on issues of feedstock's and bulking agents. Many of the questions pertained to the problems of contamination and opinions on compostable plastics. Understanding the impact of compostable plastics and contamination on the organic waste stream was a central piece to both sets of interview questions. Haulers in the state of Vermont have a growing pressure to regulate the loads they pick up from business, households and companies across the state. The regulatory pressure is mirrored by the stress felt by composters to keep contaminants out and decide whether to take compostable plastics. It was important to formulate tailored interview questions for haulers and compost managers/operators to understand how the Act affects both ends of the organic waste stream.

The questions I chose were organized with the intention of making the interviewee feel at ease and gain a sense of comfort with me as I continued to ask questions. To do this, I started with basic questions and moved towards more opinion based questions. Each interview began by

asking his or her name, the business or entity they work for and a mission statement or a basic synopsis of the work they are involved in. This allowed the interviewee to explain his or her role in the business they work for or own, and provide any preliminary understanding of their business mindset before I continued to questions regarding Act 148. Designing my questions to reach peak discomfort in the middle of the interview allowed the interviewee to ease into expressing hard opinions. I ended the interviews with an opportunity for the interviewee to express creativity and optimism for the future of Vermont's waste stream. The concluding question of each interview was what do you think the future waste stream of Vermont looks like? The prompts I used for this question were asking whether or not they saw room for new innovations and if so can they predict any or do they have any in mind. This granted the opportunity to leave the interview with an inspiring attitude towards the interview experience as well as a positive outlook on the implications of Act 148. My concluding questions were intentionally designed to provoke innovative thought among the hauling and composting community of Vermont.

As I was designing my interview questions, I looked for advice and input from my advisors as well as those involved with the implementation of the Act. I contacted Josh Kelly from the Agency of Natural Resources to help me create a comprehensive list of questions that would fully address the core underlying issues with Act 148. Josh emailed me a list of questions to add to my initial draft interview questions. It was important to get Josh's input in order to confirm that my research would be of use to greater entities than just by own education. The questions that Josh had be add to my list were as follows:

- Do you have interest in expending your operation to accept food scraps if you are not accepting them already?

- What resources do you need to help improve your operations/business of managing organic materials?
- Do you buy carbon to supplement your composting recipe? (skip supplemental questions if the answer to this is "No")
 - Where do you buy your carbon from and what form is it in?
 - How frequently do you need to buy additional carbon?
 - On average how much carbon do you buy at a time?
- What is your current operational cubic yard/tonnage? (Is that wet cubic yards/tons?)
- What is your permitted maximum capacity? (daily or annually?)
- What do you see as hurdles to modifying your business to accept food scraps?

I included all of these questions in the final draft of my interview questions.

Working with Josh Kelly in formulating interview questions was key to attaining results useful to the state of Vermont. I wanted to work with the state to confirm that the research that I was committing to would help the greater Vermont community rather than be wholly for my own educational experience. Josh Kelly also provided a sense of direction to my interview questions. By speaking with Josh Kelly I was able to understand what the state wanted to know and therefore what I should be diving deeper into on an opinion base rather than a factual one. For example when I asked Josh's suggested question of where do the composters get their carbon I dove deeper into their responses to understand any problems surrounding carbon and what that means for their business and the community. The initial question called for a short answer, however I worked further to gain the deeper connection the individual has to the problem.

While I was creating my interview questions I worked to avoid biased questions that assumed that the people I was interviewing knew about Act 148. I was conscious to ask questions that would pertain to people of all levels of understanding of Act 148. This allowed me to elicit responses from people of all different experience levels including those that have been involved in the Vermont waste stream for many years, or those just joining it and grasping its intricacies. The two sets of interview questions that I finalized are the following:

Interview Questions for Compost Operators:

1. Tell me a little about your business, its mission statement, or any beliefs you operate under.
2. Are you aware of Act 148 and all of its requirements?
3. What is your professional opinion of Act 148?
4. Will it affect you and your operation? How so?
5. What is your current operational cubic yard/tonnage? (Is that wet cubic yards/tons?)
6. How much finished compost do you produce?
7. What is your permitted maximum capacity? (daily or annually?)
8. Do you do your own hauling?
9. What types of feedstocks and organics do you accept? - Do you have interest in expanding your operation to accept food scraps if you are not accepting them already?
- What do you see as hurdles to modifying your business to accept food scraps?
10. Do you buy carbon to supplement your composting recipe? (skip supplemental questions if the answer to this is "No")
 - Where do you buy your carbon from and what form is it in?
 - How frequently do you need to buy additional carbon?
 - On average how much carbon do you buy at a time?
11. Do you think Act 148 requirements will help or hurt the quality of finished product?
Why?
12. How do you think the Act should be implemented?
13. Are there any major benefits of this Act for the state?

14. What major challenges of implementation do you foresee? For the state of Vermont and for your individual operation?

15. Will you need to make new investments in your business to comply with the law? Since there is no funding attached to the original legislation.

- What resources do you need to help improve your operations/business of managing organic materials?

16. What do you think the future waste stream of Vermont looks like?

Prompt: Are there any opportunities for innovation that you see in the future?

Vision of zero waste.

Interview Questions for Organic Waste Haulers

1. Tell me a bit about your operation, mission statement, mentality of business
2. Are you aware of Act 148 and its requirements of haulers?
3. What are your thoughts of Act 148?
4. Do you collect any organics/ food waste now?
5. How will the Act affect you and your operation?
6. How much organic material do you collect on a yearly basis?
7. Do you do residential pickup?
8. Where do you drop off the organics that you pick up?
9. How do you think the Act should best be implemented?
10. Are there any major issues with the organic waste stream in Vermont?
11. How will Act 148 change the organic waste stream?

12. Are there any major benefits of this Act? For you and the state.
13. Are there any challenges do you foresee for the state of Vermont and for your individual operation?
14. What do you think the future waste stream of Vermont looks like?
15. Will you need to make new investments in your business to comply with the law? Since there is no funding attached to the original legislation.

Interview Participants

In order to find haulers and composters across the state I used two lists generated by the Agency of Natural Resources (ANR). I was introduced to this list by my advisor who showed me the ANR website. I used this list to contact the initial groups of haulers and compost managers/owners across the state of Vermont. I continuously created new contacts from the initial interviews that I set up. In each interview I found that haulers and compost managers/owners openly expressed their connections with others involved in their line of work. I made new interviews from these connections and the process of making new connections continued. I found eleven individuals involved in both composting or hauling in the state of Vermont. I contacted and interviewed five waste haulers, three composters that do their own hauling and three composters that have a sole enterprise in building soils with compost. The haulers I interviewed were Casella, Myers, Kimbell Compost, Central Vermont Solid Waste District, Kimbell Compost and North West Vermont Solid Waste Management District. I included the two solid waste districts in with the group of haulers due to the fact that the districts work primarily on the hauling end of the waste stream rather than with building soil on a compost site. Although they are not considered haulers, for the purpose of my research I decided

to interview them with the same questions as the ones I used for haulers. The compost enterprises I interviewed were VCC, Green Mountain Compost, and WSWD. WSWD was included in the list of composting enterprises because of the small composting operation that they manage. The composters that also do their own hauling are TAM. Organics, Grow, and Cookeville Compost. I decided to ask this group of organic waste hauling composters the questions that I asked those that only compost. I did this because the affects of the law on those that only haul organic waste are minimal compared to effects on those that will be required to start hauling organic waste or increase their organic waste pick up. I used the same set of interview questions for the composters that do their own hauling because the effects of Act 148 will primarily be on the quality of their compost and the organic waste coming into their composting site.

During the contacting process of setting up interviews I notified each interviewee that my research was in regards to Act 148. I wanted individuals to feel comfortable speaking with me about their understanding any bias from me. By explaining what my research was focused on, they had the ability to reflect on their opinions of the Act before I arrived to conduct the interview. When I contacted individuals to interview, I informed them that my research was centered on gaining a greater understanding of how Act 148 effects them and their work. This allowed the interviewee to think about the affects and what they wanted to share with me through the interview process.

I broke down the interviews based on hauling enterprises, composting operations and composting operations that do their own hauling. This allowed me to organize the perceived effects of Act 148 on each part of the waste stream and those involved in it. The comprehensive list of individuals I interviewed is as follows;

- Cassandra Hemenway from the Central Vermont Solid Waste District (CVSWD)
- Abbie Webb from Casella
- Charles Kimbell from Kimbell Compost
- Bob Spencer from Windham Solid Waste District (WSWD)
- Matthew Proft from T.A.M. Organics (TAM)
- Lisa Ransom from Grow Compost (Grow)
- Bob Sandberg from Cookeville Compost
- Joe Sinagra from Myers Hauling (Myers)
- Karl Hammer from Vermont Compost Company (VCC)
- Dan Goosen from Green Mountain Compost (GMC)
- John Leddy from the North West Vermont Solid Waste District (NWVSWD)

These individuals and their operations and businesses were chosen because I felt that they represented the state of Vermont as a whole. I chose businesses such as Casella, Green Mountain Compost, Myers and VCC because they are large and established in their work. I chose Kimbell Compost and Grow because they are smaller, budding operations and are very new. I chose to interview solid waste districts because they offered an additional perspective on Act 148 and are greatly involved in the waste stream of Vermont. I also worked to interview people from establishments from different places across the state of Vermont in order to gain an understanding of the different regional mentalities and endeavors. It was important to capture the disparity between counties in Vermont and their rules and regulations regarding the waste stream. I sought to interview waste haulers and composters in densely populated areas as well as rural areas with sprawling development.

I conducted interviews in person and, when possible, went to the compost sites and hauling operations. I felt it was important for me to experience the place in which the individuals I interviewed do their hands-on work. I reached these places by becoming a member of Car Share Vermont. Using the Car Share allowed me to reach the places I needed to go and have a minimal impact on fossil fuel consumption. Because I was not using a personal car, rather one that is shared among the community, I was able to justify driving great lengths to reach an

interviewee. The Car Share was roughly \$60 for each trip. Subtracting costs of gas that are included in Car Share membership, the investment was minimal and reasonable.

Coding Interviews/Transcription

I used a recording device in order to obtain discursive interviews. The recording device allowed me to accurately transcribe the interviews I obtained. The process of transcription was the most time consuming of my methodology. However using interviews paired with transcription allowed for me to hear, read and write the answers to my questions. By the end of the process I was able to have a deeper understanding of the interviews. I used a phone application to conduct one phone interview. The phone interview was with a representative at Casella who is connected with the work happening in Vermont on Act 148. Abbie Webb from Casella was located in Boston and was unable to meet in person for an interview. The interviews ranged from 30 minutes to and two and a half hours. The process of transcription took roughly double the length of each interview.

In order to translate each of my interviews into results, I broke down the transcribed interviews using codes. The codes explain recurring themes as well as repetitive word use throughout the interviews. This helped me translate meaningful material into important results. There were eight main themes that arose throughout the interviews that allowed me to connect important information from each interview. The following represent the main umbrella codes and the sub codes that fall under the main themes.

Codes:

Business anxieties

- Financial
- Funding
- Regulation
- Infrastructure

- Competition and the Private Sector

Vermont Character

- Rural landscape
- Progressive nature

Mentality and Ethic

- Waste as Resource
- Community

Quality Anxieties

- Compost Quality

Enforcement

- Training
- Education/ outreach
- Pressure on haulers
- Requirements
- Inconsistency

These coding themes allowed me to break down my interviews into results that have quantitative and qualitative meaning. Using codes allowed me to communicate my understanding of the information and its greater importance to the state of Vermont.

These codes were decided on by a process of reading through interviews multiple times to acquire repetitive, important information. The first time I read through the interviews I marked all repetitive words, important quotes, and themes. I read through a second time and simplified my initial list into umbrella codes. I went through a third time to reduce my sub codes to capture all the relevant and significant information collected in the interviews I conducted. The results are contrived of direct quotes from the interviews. Nothing has been changed from the quotes including grammatical errors, slang and broken sentence structure. The quotes are informal and conversational reflecting how the casual manner of the interview experience.

RESULTS

The following results are organized into quantitative and qualitative data that represent amounts of food waste diverted from the Coventry Landfill in Vermont and the amount of organic waste composted and turned into soil amendments. The numerical data collected show a portion of data from the Vermont organic waste hauling community and composting community. The data are a small representation of the comprehensive group of composters and haulers in Vermont.

Another section of the results pertains to the analytical and descriptive coding that was used to assess the interviews conducted. The coding results are inductively reported, gauging core themes and patterns. The codes provide a filter for the various responses received in the interview process. The eleven interviews that were conducted are coded into imbricate responses that tell a story about the current waste stream of Vermont, the future waste stream and the impacts of Act 148 along the way. The results inform the struggles induced by Act 148 that are pertinent to the hauling and composting community of Vermont and their opinions of the intentions of the Act.

Quality Anxieties

Compost Quality

The code Compost Quality is a deductive code coming directly from what the interviewees reported during the interview process. The code encompasses many aspects of compost quality including carbon amendments, contamination of feedstocks, the impact of compostable plastics, and individual understanding of what quality compost is. Of the eleven interviews conducted, ten spoke of elements that fell under the code Compost Quality.

The first prominent result that surfaced under this code is contamination. Abbie Webb from Casella revealed concerns about Act 148 increasing the challenge of maintaining high quality soils and low contamination levels due to the increase in food waste inputs. This is echoed by Bob Spencer from WSWD who stated that, “My really big concern is that when it is mandatory, in the sense of pay as you throw or enforcement, that the quality of the materials being disposed of will be significantly reduced and result in compost product contamination.” Bob Sandberg at Cookeville Compost echoed the concern of contamination; his greatest stress is plastics that he has to pick out of the loads he picks up.

On the other end, the Central Vermont Solid Waste District (CVSWD) is proud of their abilities to provide a clean stream of organics to their composters. Cassandra Hemenway, the Zero Waste Outreach Coordinator at the CVSWD stated that, “We may be the best in the nation at doing this, in just making sure that these organic compost facilities get a really, really clean pristine stream of material.” This expresses the need for a clean stream of organic waste in Vermont. With the phase-in mandates of Act 148, many are expressing fear of a projected correlation between increased organic waste diversion and increased contamination. John Leddy from the North West Vermont Solid Waste District (NWVSWD) backs this anxiety by saying, “The residential waste stream is going to be much dirtier than the waste stream that we are currently seeing.” Karl Hammer from Vermont Compost Company (VCC) expressed his frustration by his belief that Act 148 has the potential to increase contamination in the organic waste stream and ultimately in the landscape. “I think we have a huge opportunity in Vermont to really make very good compost; we have the potential that we will make a bunch of not good compost, of very low value-- either for sale or worse-- that potentially an inclusion of a lot of

plastic trash and other contaminants in our soils and that's something we would rather not do because remediating that is much harder than not doing it in the first place."

Contamination

Out of the five composting facilities visited, all of them expressed that they believe Act 148 will increase contamination in the organic waste stream. Karl Hammer from VCC and Lisa Ransom from Grow Compost (Grow) expressed that they will not let the predicted increased contamination of the organic waste stream affect their businesses. Ransom confronts this by being her own regulation system, stating "our highest goal is to create healthy soil, it's really important to us that that's a clean stream which means we have to control it, which means we have to haul. So our business has gone from a small operation to make good soil to a hauling operation that's as big as any solid waste entity." Hammer foresees that "there's going to be a lot of pressure to accept and allow compostable plastic bag liners so that we can avoid washing containers." Hammer points out that he feels confident denying compostable plastics because, "National Organic Program² does not recognize these compostable plastics as acceptable in compost to be used in organic agriculture." Not only does Hammer not want the compostable plastic from the liners in his compost piles, but he believes that the liners increase contamination as well. "It assures that non-compostable plastics are hidden in the bag." Matthew Proft from GROW. Organics believes that "the quality of these organics will run the gamut of clean to heavily contaminated." Proft said his company plans on maintaining their organic certification, meaning they won't tolerate contamination and won't be taking compostable plastics that are accepted by other non-organic certified composters such as Green Mountain Compost.

² The National Organic Program is a regulatory program that ensures integrity of USDA organic products. They are responsible for developing national standards for organically produced agricultural products. (National Organic Program, 2014)

Green Mountain compost, in conjunction with WSWD, supports the incorporation of compostable plastics into their feedstocks. They believe it is better to divert more compostable matter from the landfill than to have organic certification for their compost. Bob Spencer from WSWD believes it is important to make a quality compost, however he does not wish to aim for organic certification due to his belief that compostable plastics are a beneficial part of increasing diversion from the landfill. Dan Goosen from Green Mountain Compost (GMC) expressed, “we have two main focuses, one is making high quality compost and related products and the other is diverting as much as possible from the landfill so that’s why we’re excited about Act 148.” He followed this by explaining that he believes compostable plastics are an “important tool for increasing the amount of organics.” Joe Sinagra of Myers, a hauling company that delivers organic waste to GMC stated, “Some see compostable plastics as a necessary evil and a business model.” Sinagra expressed that his company appreciates that GMC is not certified organic because “it’s easier to not have to enforce the organic side.” Myers also uses compostable plastic liners in order to keep their totes clean therefore reducing costs.

Carbon

Under the same coding process, carbon was portrayed as a Compost Quality anxiety. Due to an increased amount of competition with electricity production—as wood chips are primary sources for biomass—carbon has become a scarcer commodity for composters in Vermont. Bob Spencer expressed his thought that “carbon is going to be a very big challenge in Vermont.” He believes that the competition with the production of electricity will increase as food waste diversion increases and creates a higher demand for carbon feedstocks in the compost recipes. He expressed that he does not have to use as much wood chip carbon supplements because of his

acceptance of paper products in his compost recipe, however other compost facilities feel that paper does not meet their standards as a feedstock. Out of the five composters interviewed all of them expressed their constant need for carbon. WSWD, GMC and VCC expressed carbon needs as a current and future stress. Karl Hammer from VCC stated, “At a certain point we compete directly with burning for electricity, the price of a load of wood has gone up enormously this year because the value for burn went up.” It is becoming increasingly expensive for composters to compete for carbon supplements in their compost recipe.

The code ‘Compost Quality’ revealed that many anxieties of the composting and hauling community are based on contamination of the organic waste stream. This code expresses the delicate balance of ingredients that make up quality compost as well as the varying definition of quality compost. The personal beliefs of each interviewee on compost quality reveal the intricacies and absence of consistency from one enterprise to the next. The main disparities exposed by this code are that some composters believe that compostable plastics are beneficial to reaching state goals in order to divert more from the landfill while others believe plastics are a detriment to the landscape. Some individuals are experiencing the pressure of carbon competition while others are obtaining carbon with ease.

Mentality/Ethic

The code Mentality and Ethic is an umbrella code that encompasses themes such as community support and engagement, thinking of waste as a resource and the mindset and motivation behind why people are composting and should compost. Out of eleven interviews, 100 percent contained a statement pertaining to the code Mentality and Ethic. ‘Mentality and ethic’ was used as a code to show when people are using their own moral code to decide to

compost. This code depicts an ethic towards taking responsibility for waste and a supportive mentality of moving towards a more environmentally sound, efficient waste stream.

Business Ethic

The code mentality and ethic surfaced in the expression of attitude toward the increased organics diversion as a part of Act 148. Joe Sinagra from Myers Hauling explained that the Act is simply the “right thing to do” because of the increased diversion of organic waste. Sinagra painted a picture of the restaurants and companies he works with and their mentality being a contributing factor to why their organic waste hauling is able to be successful. The businesses “have a core mission belief in compost.” He said that for these businesses, “it wasn’t about money, it’s just this is the right thing to do.” Hemenway from the CVSWD divulged a parallel understanding stating, “If [restaurants] are making the decision to do the right thing and divert their organics, they’re making a decision to take on an extra expense.” Hemenway’s work at the CVSWD is about doing the right thing regardless of revenue. “Our cutting edge programming has been our organics collection. It’s a philosophical debate, that’s been going on in our Board of Directors for a while now. The goals aren’t really about making the money, the goal is about fulfilling our programming.” Webb from Casella echoed the importance in a shift of thought. “For Act 148 to succeed we need to persuade generators to divert based on all of the merits of organics diversion; the conversation can’t be only about cost.” Sinagra divulged his perception of the difference in ethic between members of the compost community in the state. “A lot of people who are coming in on the non-organic side see it as a business model and I don’t know if they, I don’t want to say have the core environmental mission that others have, but I don’t think it’s the top of their list. I think Karl would do whatever it takes regardless of money to do the organics

the correct way.” The shift in thought must go from being about money and business to being about the comprehensive list of benefits from increased organics diversion. Conversely, Hemenway understands money to be a powerful incentive to increase organics diversion, “because that’s really what most people want to hear, what’s my bottom line going to be? We have to do this because we’ve only got one planet, and unfortunately there are still plenty of people who don’t give that any consideration at all but if it affects their pocket book, then they will.”

Sinagra expressed a fear that enforcement of the Act on a smaller level will fall on those who do not share the same mentality. “It’s going to depend on people making minimum wage to implement a law... I can just imagine the 17-year-old high school student making minimum wage, they don’t care. Why would they? Why should they? It’s one thing if you believe in it.” He explained that he believes there are more people who understand and care about compost as a part of their ethic, however there are still many that do not understand its importance. Matthew Profit from TAM understands the difference between composting through self motivation and being told to compost and its affect on the organic waste stream. “I guess the challenge and the downside for us on that is that people that are forced to do it, they’re not going to care about what goes in, unlike the quality of the material you know from the clients we have now, they want to do a good job.” John Leddy from the NWVSWD sees an improvement in responsible ethic towards waste. He indicated that the people in his district “want to do the right thing and it’s increasingly difficult.” He explained that he is finding more and more people taking responsibility for their waste. However, Webb from Casella understands that the mentality of compost being important to the waste stream is not one held by most and that may affect the integrity of the organic waste stream. “Act 148 is designed to draw participation beyond that core

group of ‘deep green’ minded people. As we ask a broader part of the population (the lighter greens) to participate, it will probably be harder to maintain that extremely high quality and low contamination.” Karl Hammer expressed his positivism towards the this possibility stating, “I’m optimistic that enough people stop shrugging and say no, we can do this, this is important.” Bob Spencer from Cookeville Compost believes one way to get people to change their mindset is through information, “educate people and make them believe that its really important.” Leddy enunciated that, regardless of the difficulties involved, Act 148 is “the right way forward.”

Community

The topic of community is placed under the ‘mentality and ethic’ code because of the influence communities have on mentality. The in vivo sub code, meaning taken directly from the context of the interviews, of community was prominent in the eleven interviews conducted. Communities have influence over what ethics are commonly held. In addition, communities of people have the ability to create a norm around a certain way of thinking. However when communities already have a standard around a certain action or mentality, it is increasingly difficult to change. This is supported by Ransom who said, “change is always difficult for communities of people, and so there’s some anger around it from businesses and people feeling like this is being enforced on them.” Throughout the interview process, haulers, composters and residents of Vermont were all referred to as individual communities. Community was also referred to as a source of motivation for starting business. Lisa Ransom at Grow said, “Our business is really about engaging our local community.” Through using community engagement, change may become easier. John Leddy voiced his belief that community engagement and support can help accommodate the increase in organic waste from Act 148 mandates. Leddy

stated, “We’re working on a system, working with community gardens and really localized drop off points to capture some of our need and I sensed a lot of community support and enthusiasm for that approach.” Leddy explains that a new norm of thought and action can be created from what already exists, “We’re not trying to reinvent the wheel, we’re just trying to look for resources that we have on our hands and create a culture of recycling [organic material].”

Community was also expressed by Proft as a way to deal with a problem as a group stating, “all haulers will be in it together” dealing with the stresses of enforcement and contamination. This was expressed as an aspiration by Proft, but Sinagra explained his previous failed efforts to bring the hauling community together. When talking about closing the Moretown landfill, another event that would have great effect on the hauling community, “we really tried to spearhead sort of a haulers discussion over what’s going to happen what can we do? Not so much dollar and sense things, but jeez (sic) what are we going to do if this happens? And I called 30 different haulers and very few would even discuss it with me.” Sinagra expressed that there is no sense of community because all haulers think, “the other guy is out to get him. Nobody wants to talk to anyone else because everyone thinks there’s some hidden motive.”

It was shown that community is an important piece in the implementation process of Act 148. Community plays a role in how haulers and composters in the state of Vermont will work together to comply with and enforce organic waste diversion. By looking at the community as a sub code it was shown that composters in the state have a good working community and haulers, although interested, are struggling to create a supportive and collaborative relationship. The community of each district in Vermont was perceived as resource for finding infrastructure or willingness to creatively divert greater amounts of organic waste from the landfill.

Waste as a Resource

‘Waste as a resource’ is a sub code used to explain further motivation for supporting organic waste diversion through the implementation of Act 148. Understanding the importance of using waste as a resource creates an ethic around not allowing that resource to end up in a landfill. Hemenway expressed that, “I do think that Act 148 is changing the way that people think about what they put in their trash and every single person I talk to, every individual. It makes people really think about what they’re considering waste.” Hemenway continues to say, “It introduces that idea that just because we call it trash doesn’t mean it is.” Leddy states his frustration with the current outlook held on waste saying we are, “currently putting a lot of valuable material into a hole in the ground.” Leddy expressed his frustration with our system of consumption and disposal that has produced the commonly held definition of ‘waste.’ “Hopefully this law and the extended outreach that go along with it and the system that it puts in place can divert our population from the mentality of the linear thinking of our current system.”

Ransom supports this notion saying Act 148 “is an opportunity because it is engaging all strata of our community and of the state to recognize their waste as a resource.” Ransom continued to express content with the creating a new understanding of waste, “I’m so excited about people understanding our resources, our organics as resources for our soil and for our earth. I love people feeling empowered when they finish an apple and they can put it in the compost. That moment is what its all about.” Sandberg agrees that Act 148 will help create further use of an unnoticed resource, “It’s such a waste of resources to throw it away, that’s the one thing that’s really nice about this. I really feel good doing it and people that work with, most of them are happy that im doing it and they’re willing to pay for me to do it. That makes it all nice.”

The findings that arose from this code are that composters and haulers are hopeful that Act 148 will enable more people to understand waste as a resource rather than a burden. The individuals interviewed expressed their appreciation for upcycling organic waste to become a soil amendment. The sub code ‘waste as a resource’ is a way of changing mentalities in Vermont to allow for a continued progression to lower ‘waste’ production in the traditional definition of the word.

Enforcement

The code of enforcement looks at the issues with enforcing Act 148. Throughout the phasing process of implementation it is important to understand how composters and haulers believe enforcement should be handled. The enforcement code captures what composters and haulers believe is the right way to keep the organic waste stream clean from the angles of regulation, training or haulers, education and outreach to the general public and addressing consistencies of hauling and composting operations. This code combines and incorporates all of the techniques for enforcing that the organic waste stream stay clean. This code reveals the best way to move forward as implementation continues from the view of those that will have to enforce and regulate organic waste.

The theme of enforcement showed that many of the individuals interviewed questioned how Act 148 would be established among waste producers. Kimbell Compost and Proft used the same phrase in expressing their concern with the lack of dominion over the implementation process. Understanding the rigorous requirements and demands for compliance from the Act, they stated that the law is “without teeth.” Bob Spencer from WSDW explained that, “It’s going to be implemented largely through the solid waste districts and there’s so many pieces of it

passing ordinances.” However at a business like Grow they are self-sufficient in their enforcement and do not rely on anyone else to get a clean waste stream; “we watch every single thing that comes in.” The issue with enforcement in Act 148 was expressed as daunting and a seemingly meticulous process that does not address the main reason for diverting organic waste. John Leddy expressed, “some people see something that’s mandated by the state and think well how are they going to enforce that? Are there going to be people digging through trash cans making sure there’s not a banana peel in there and I think that misses the big picture of the purpose of the law.” One of the main purposes of Act 148 is to divert organic waste because of an understanding that organic waste going into a landfill is a wasted resource. In order to achieve the goals of the law it was expressed that it is important to convey the importance of using our waste as a resource in compost feedstocks.

Education and Outreach

‘Education and Outreach’ was shown to be a consistent sub-code under the umbrella code of ‘Enforcement.’ Education for waste generators, training for haulers and outreach to communities were expressed as important pieces to successfully implement Act 148. Sandberg from Cookeville Compost supported this by saying that what we need to do is “tell people as much as possible, give them education about why they’re doing it [composting].” Webb from Casella expressed her belief that education will be crucial throughout the process, “Crafting and passing the law was a great first step. Now I think the state can focus on educating generators, and observing the marketplace to see how the private sector, non-profits, and municipal entities are responding to the rules.” Not only is education and outreach an important part of implementation, it is also a surfacing requirement of waste districts. Spencer from WSWD

explains, “The Materials Management Plan, that’s ANR’s newest document that’s describing what municipal solid waste plants have to do. And is very aggressive in requiring that, and its mainly the district, you have to work with so many schools per year, you have to work with so many businesses per year to educate them on Act 148.” Leddy supports the instruction from the Materials Management Plan, “it dictates things like outreach that we have to do to businesses and really ups the level of responsibility that we have in terms of our outreach and education.”

Hemenway at CVSWD explains that they are already reaching out into their school community to educate, “We have two people who are just in those schools all the time training those kids and our program, we reach out to our participants regularly either from the ground where the field staff are picking up, when they’re picking up the stuff they can talk immediately to the kitchen staff.” Ransom from Grow voiced that in order to achieve a clean organic waste stream, “it takes training but people are not stupid, they can do it.”

Sinagra from Myers hauling business expressed that they are already in the process of educating their larger producers and will focus their efforts there. “Right now we’re focused on helping our commercial customers become compliant with Act 148 when it comes to residential piece, we’re still not sold that its actually ever going to happen.” Education was expressed as a challenge yet a fundamental tool in implementation. “Education is going to be a huge challenge to meeting these goals and there’s always going to be a knucklehead who just doesn’t want to do it. Whether it is because somebody told them that they had to, or whether it is because they just want to rail against what other people are telling them is right,” explains Leddy.

Pressure on Haulers

'Pressure on Haulers' transpired as a sub-code beneath 'Enforcement' due to the enforcement responsibilities on the hauling community. This is an issue because many of the smaller hauling operations are unaware of the approaching responsibilities. Hemenway at CVSWD explained that the state of Vermont does not have the system in place to provide trainings to haulers. "As we're meeting and figuring out how to implement this we really need to address how to provide trainings to haulers or how to make sure that they're understanding these requirements." Leddy from NWVSWD expressed their place in helping the hauling community understand the pressures placed on them by the implementation of Act 148, "We have some oversight over the hauling community as to whether or not they're meeting the states guidelines. Right now we're more of an ally for the haulers to help them get up to speed so providing training and guidance really."

Haulers expressed their uncertainty of what Act 148 will require from them on the enforcement side. Proft from TAM asked, "who is going to be charged with the work involved in making sure these laws are followed and the food scraps are clean?" Sinagra from Myers confirms the stress expressed by Proft stating, "how are we going to educate and help the haulers? Because they're just putting this at the doorstep but not telling us really much more than you have to do this. Well who is going to train us?" Although Myers may be aware that they have to find a way to train the hauling community, Hemenway expresses her concern for the small hauling businesses, "those people are probably the least aware of the law and what it's going to mean, even though we've been reaching out to them, and the most affected." Sinagra continued to explain, "the state is putting us haulers at a disadvantage because they're expecting us to be experts on it. We know just as much as somebody else." Hemenway acknowledges the

pressures placed on haulers and predicts a need for support, “we’ll probably have to get involved in coming up with some creative solutions but its really kind of on the haulers right now they’re going to be required to offer compost collection services alongside recycling and trash for curbside for every place they go, if they’re doing curbside pickups they’re going to have an organics collection alongside those other tow bins.” Hemenway continued her concern for the hauling community saying, “the state really did put a lot of this on the haulers. They really did... The haulers are going to have to change the way they do business, whether or not they like it.” Leddy echoed Hemenways concern for support from another waste district saying haulers “will have to offer the service and the law says, the service has to be offered whether by that hauler or subcontracted. In our district we’re having a meeting with haulers at the end of March to sort of introduce the law and then to set up further meetings.”

Enforcement from the hauling community is one of the ways to ensure a clean organic waste stream and that more organics are diverted from the landfill, however it is a huge undertaking. Proft explains, “We can’t do that as trash haulers, we can’t be looking in people’s garbage, I don’t know how that’s going to happen and I don’t want to be pessimistic but we have a huge hurdle to overcome.” Skepticism around the process of enforcement was expressed by Sinagra “what’s the enforcement side? Is the state going to depend on haulers to turn in their customers?” However, Hammer from VCC relies on his haulers to maintain accountability “because now in our solid waste system trend, the driver whose very motivated to discipline the generators on trash will pull out whatever, walk right back in and say hey what’s with all these milk cartons or juice boxes.” At Myers they are active in holding their customers accountable due to the fee that goes along with dumping a contaminated load at the landfill instead of at a compost site. However, as household organic diversion is implemented, the opportunity to hold

people accountable becomes more complicated. “We’re communicating with a manager or an owner, so for them to be able to go to their wait staff and say listen you can’t throw cardboard in the compost, if you continue to do it you’re going to lose your job. Ok that’s the carrot. And for us to say listen, your wait staffs screwing up there’s nothing, they cant do that. That’s fine, but you can’t, well I was going to say you can’t fire your husband, you can’t disown your children for throwing away the wrong stuff,’ explained Sinagra.

Concerns about accountability and enforcement were expressed about establishing new composting sites as a prompt from Act 148. Hammer explained, “if funding comes through there’s got to be a lot of accountability, you know ANR has to demand, they don’t just write checks like here ok we’re going to pay for half of your operation, and go and start making compost. There’s got to be a lot of accountability or else it’s going to be done irresponsibly and people are going to make poor compost and earth.”

Inconsistency

The issue of inconsistency in the state of Vermont surfaced throughout the interview process. The sub-code of inconsistency was enunciated through stresses pertaining to enforcement. Many of the inconsistencies come from the different feedstocks that composters accept, the strategies of different hauling companies and between different districts in Vermont. Webb from Casella observed that, “Vermont’s compost facilities vary somewhat in the types of materials they will accept (examples: waxed cardboard, compostable cups, compostable forks). There are good reasons for this, but it poses a bit of an education challenge to tell someone that what they put in the green bin in Burlington can’t go into the green bin in Montpelier.” This supports the influence of consistent services on the need for education and outreach. If there is

one system that all districts follow, the education and outreach part will become easier because you don't have to learn a different system each time you are in a new county in Vermont.

Hemenway supported this by saying, "because of the nature of Vermont, because we have these solid waste entities that are sort of self-governing and different everywhere you go. I think one of the goals of Act 148 is to create more consistent services statewide and I'm hoping that is what comes out of it." Hemenway addressed this need with reluctance saying, "I think the goal is to achieve consistency of services and I'm not sure if that's going to happen right away. I think that's going to take a long time." Goosen from Green Mountain supported the need for statewide consistency expressing the importance of "working on statewide language around, you know symbology and if all the messaging continues that way it becomes kind of a big push of the statewide effort where there's certain standards to be met statewide and I think it can be done." Spencer from WSWD believes one way to achieve consistency is "make membership in solid waste districts mandatory because there's towns that aren't." Because of the rural nature of Vermont, not all of the towns in Vermont are part of a waste district. This creates a problem when the task of implementation is handed to waste districts. In the towns that do not have membership in a waste district, enforcement and implementation pressures will fall solely on hauling businesses.

The issue of lacking consistency emerged with the topic of compostable plastics and the ability to hold waste generators accountable for contamination. Hammer explained, "the challenge with the compostable bag is that it almost assures that you will have non-compostable contaminant plastic hidden in the bag, if you don't have a collection strategy with direct accountability back to a generator that means that someone tips something up looks at it and says wow PLU stickers." The hauling community also feels the frustration of inconsistency in

compost standards. Sinagra from Myers explained, “then you have organic and non-organic compost. So you have that issue too where you have some people who are true organic, various people are going to be able to get to that level of it.” Goosen believes it is important for composters to come together to decide on standards of feedstocks in order to make sure the quality of soil does not decrease. “I think working together we can come up with standards and hopefully prevent that from occurring, but yeah it has a potential to decrease statewide.” Hammer is a part of a newly formed working group that is engaged in creating avenues for consistency among composters. He explained, “So a part of the goal of this working group is to move toward some agreed standards about compost.”

Business Anxieties

Throughout the course of the interviews it became apparent that the major concerns held by both composters and haulers about Act 148 were related to finances, infrastructure, regulatory issues, and funding. These concerns all fall under the umbrella code of business anxieties. Financial struggles were expressed by the hauling community due to the increased expenses that come with picking up organic waste. Sinagra from Myers explained, “Compost takes longer than picking up trash and recycling. So you know, a day where we could do 150 stops for trash, we’re probably only going to be able to do 100 for compost. So that means one more man, one more day. More money, more costs, more energy.” Sinagra explained that in order for them to pick up organic waste, Myers would have to invest in an employee and a truck that would amount to roughly \$100 per hour. Myers will also have to absorb the costs of disposing of contaminated loads at the landfill rather than the compost site. Sinagra illustrated that “even if we are able to

charge a customer our compost rate, the compost rate is substantially less than the trash rate³, so we will charge you \$12 for a compost tote where it would normally be \$30 for trash. The \$12 tote is going to be contaminated so we're going to have to dump it as trash so it costs us more than \$12 a tote to dump trash. So were going to take a net loss."

Myers and Casella are large businesses that handle a substantial proportion of the solid waste in Vermont and are able to deal with many of the costs that will come along with Act 148 mandates. However Spencer from WSWD predicts that "collection is going to be costly, it's going to potentially hurt smaller haulers, the bigger haulers can absorb some of these things easier." Leddy from the NWVSWD is trying to combat this issue, "I'm trying to impress on haulers the knowledge that they can charge whatever it costs them to cover their costs."

However, pricing competition can create an issue for small haulers who have to charge a higher rate in order to meet their costs. Sinagra addresses the concerns of small hauling businesses, "A lot of the little guys are, rightfully so, concerned that if they go against Casella then that Casella could if they wanted to take every one of our accounts. Because they can go in and charge everybody fifty dollars and we can't touch that. Luckily we're large enough where we can make, on principle do the same thing to them not on their accounts, where the Gauthier's⁴ of the world can't even do it on one account."

Financial anxieties are not specific to the hauling businesses in Vermont, the composting industry is experiencing it as well. Hammer from VCC and Ransom from Grow explain that getting into the composting business is not easy and often poses extreme financial struggle. Hammer explains, "composting as a practice in Vermont so far is tough, its thin margin business,

³ The fee for tipping trash is higher because the cost of maintaining a landfill is high and does not provide a return. Tipping organic waste at a compost site is considered an amendment to their compost recipe and will result in a financial return(DSM Environmental Services, 2005).

⁴ A small waste hauling business in Vermont.

it really is.” Ramson exposed the difficulties of owning a composting site stating that, “we’re living just like a farmer, so I’m not complaining but I’m saying we’re living like a farmer. You know on subsidies and doing the best we can.” Spencer supports difficulties with entering the composting industry, “its just not an easy business to get into, its expensive.” From large and small private businesses to municipal composting sites, business stress is a common concern. Goosen from GMC supports this, “there’s a lot of things that make composting a challenge and the finances around making it a successful business just aren’t there and a lot of people say well I couldn’t do that but maybe that will change. But even with the high price that we get for compost in Vermont, it’s a bit of a challenge.” Some of the regular monetary obligations for composters pertain to purchasing carbon feedstocks, investment in new technologies and infrastructure, and labor. Each enterprise is able to cope with their financial obligations in different ways including applying for grants, working off of subsidies or reaching to outside markets for increased price value of compost.

Funding

Funding is a component of the implementation process of Act 148. The Act is currently unfunded and adding to business anxieties. The general concern held by the composting and hauling community of Vermont is that the implementation of Act 148 has to be partnered with funding from the state. Sinagra expresses his skepticism of the legislative decision to continue implementation without funding,” I don’t personally think that the legislature has thought it completely out both a funding mechanism and also a reality standpoint of I think they’re a little over zealous with how soon they want everyone to do it.” However Leddy see the conversation around funding evolving, “In terms of monetary support, there will need to be monetary support.

So there's been discussion of creating a separate fund for evolving low interest loans and grants in order to build that infrastructure at the state level." Funding will be necessary in building necessary infrastructure to meet the demands of Act 148. The NWVSWD and CVSWD currently operate off of fees on dumping trash at the landfill. However, as the weight of trash decreases due to increased composting, the returns to fund the composting program will decrease. One of the goals of Act 148 is to divert all organics from the landfill, however the weight of organics going into the landfill are currently a way to make money to fund future composting infrastructure. In order for the implementation of Act 148 to be successful, funding must be provided. Hemenway from CVSWD supports this, "I don't know all the politics of how to get that funding but I know their needs to be funding from the state level to make this happen." Funding was expressed as essential to meeting Act 148 requirements.

Regulation

Another business anxiety was dealing with regulatory struggles. The stigma around composting is expressed by Hammer and Ransom who both experience push back from neighbors and community members. Hammer explains composting "can bring down so much regulatory trouble if, basically if anybody complains about it and there are, you know this is about a culture change and there are people who really believe that they don't want it anywhere near them, that its yucky." The work of a composter is necessary in a world of decreasing resources and depleted soils however, many are distracted by their negative perceptions of odors and views of compost sites. Ransom expresses her frustration around this saying, "when people want to complain about the smell of compost, okay that is not hurting your body, those aren't emissions that are hurting your health, killing you, those are the smells from a compost facility."

Meeting regulations about smell is a struggle to many composters in the state of Vermont. Spencer believes one way to combat this problem is by building enclosed composting infrastructure. In order to understand how to productively continue with Act 148 requirements, current regulatory struggles must be addressed.

Infrastructure

The concern about financial struggles is directly related to struggles around building and investing in new infrastructure necessary to complying with Act 148. This is shown through the \$2.3 million investment in the facilities at Green Mountain Compost. Spencer at WSWD hopes to “get financing and build a more sophisticated facility that will serve the region for the next however many years, 20 years. But how that’s going to be done and paid for, its all got to be figured out.” Spencer believes that in order for Act 148 to be successful there should be a composting facility in every county in Vermont. He predicts the investment in new indoor facilities to be hundreds of thousands of dollars. Hammer is wary of this mentality stating, “The decisions we make about landform and infrastructure do matter in 40 years. Now you can make a place, you know you pour enough concrete and it’s really the way at a certain point. So you go to Green Mountain, think about turning that back into a garden. Well it can be done, but it’s a huge embodied cost and it doesn’t transition.” The need to increase infrastructure in Vermont is understood by everyone. Webb from Casella believes that there will be better utilization of existing infrastructure in the state and over time new infrastructure will be built. As the major waste management enterprise in Vermont, there is an opportunity for Casella to take over. Webb addresses this by saying “We will be making thoughtful investments in our collection and processing infrastructure. One thing you wont see us doing, for example, is rushing to build a

giant centralized compost facility smack dab in the middle of the state.” Composting sites and facilities will be necessary to the implementation process over the next six years.

Act 148 poses a stress about infrastructure to the hauling community as well. Many haulers will need to invest in new trucks for hauling compost. These trucks will have to be compatible for cleaning totes as they are picked up. An investment of this size is substantial for many small haulers across the state. Sinagra addressed this by saying that small haulers “can’t afford to buy a \$300,000 compost truck. Where I can’t say we can, but it’s easier for us to do that, and Casella.” Sinagra is hopeful that Senator Bob Hartwell will work to create subsidies for small haulers to help them retrofit their existing trucks. Other infrastructure costs include purchasing containers, screeners, and totes.

Act 148 provides the opportunity for composting and hauling businesses to grow. In fact, it will be necessary for many of them to grow in order to meet the demands of the Act. Nonetheless, the ability to do that resides in monetary investments in new infrastructure and technologies. Many businesses do not have the financial capacity to achieve their aspirations.

Competition and The Private Sector

Competition between hauling and composting businesses was a major theme of business anxieties. There are businesses such as Casella that would be able to take over the organic waste hauling industry if they wanted to, however it is important to keep multiple hauling operations in business because of its ability to drive pricing down. Sinagra explains,” competition is good. We don’t want two haulers in Vermont, we like to see the *Clean Greens* and the *Duffy’s*⁵ and the *Gauthier’s* of the world being competitive because it helps drive the cost down on all of us.” He

⁵ Clean Green and Duffy are small waste haulers in Vermont.

also believes that if small haulers cannot stay in business through the process of meeting regulations, it will create an unsustainable dependence on the bigger businesses in the state. Hemenway supports the need for the private sector, non-state enterprises, to take over. “I really think the best-case scenario is if the private sector embraced this. Instead of seeing it as a burden saw it as an opportunity including you know people who may be interested in starting up their own compost facilities, including haulers, including you know businesses, restaurants, it’s a huge opportunity.” The balance between creating healthy price competition to drive prices down while keeping everyone in business will be difficult to achieve.

There is a disparity between wanting multiple businesses to take over composting and hauling operations and consolidating enterprises. Spencer holds the belief that in addition to every town being a member of a waste district, there should be a facility in every county. This would place all of the responsibility of managing waste on state infrastructure. This differs from the views held by Hemenway and Myers who believe multiple private businesses are the way to achieve successful implementation of Act 148. Kimbell Compost explains his thoughts on the private sector, “I think profitability and sustainability coexisting in a private enterprise for public purpose is a cool thing.”

Vermont Character

The Vermont character was brought up as a leading factor in how Act 148 will be carried out. Vermont is a small, progressive state that allows for a unified identity among its citizens. This may not allow for a unified mentality however the unity lies in the pride of those that live in the state. Hemenway supports this by saying, “the other thing that Act 148 does is the thing that Vermont seems to do really well, because I think we’re so small and progressive that we are able

to do cutting edge things that other states don't have the political will for, or they're too frightened or too in a box but then they see it work in Vermont and they take it on." Many people in the state already understand the importance of composting and have been doing it all their lives. Ransom supports this by saying "a lot of people in Vermont get it, I mean they've been composting they're whole life in their backyard so they get it." Leddy explained that the way that Vermont deals with its waste is only a recent phenomenon "people in rural parts of my communities who composting makes absolute sense to and when you talk about it, people sort of reminisce about how their grandparents in the depression era, who that was the way they did things, and it was only their parents who moved to modern mid-century era of now we're taking all of our trash and putting it on the curb and we don't have to think about it anymore." The foundation of a basic understanding is paired with the supportive, local community mentality of a Vermonter. Webb addressed this by saying, "Recycling organics is a way to return nutrients to Vermont's soil, support local agriculture, and strengthen the rural character of Vermont. It has natural ties with the local food, renewable energy, and regional economy movements. This type of framing will help to build community acceptance and pride." The opportunities presented by Act 148 could help create many wonderful soils or it could contaminate the landscape with plastics. Hammer explains that contamination and poor quality soils are not the way Vermont does things "The Vermont brand, lets keep it true. True is the easiest position to defend, in branding or advertising, true is good because it's self-supporting, ours is cleaner. Vermont composts are cleaner because we as a community have made this effort."

Spencer from WSWD discussed his understanding of Vermont in the spotlight of organic waste legislature. "There's a lot of attention on Vermont right now on a national level because this is the first state to do this." Hemenway also acknowledged the attention on Vermont and

sees it as an opportunity to spread awareness and action in other states. “If legislature is able to pass really cool cutting edge legislation that often is very controversial and then it becomes a standard and other states watch it and see how it goes and then they sort of copy their version of it.” However in order for the Act to be successful it has to stay true to the overwhelmingly rural landscape. Hammer is concerned that solutions will be formed around centralization rather than localized efforts, “I worry a little bit sometimes about, there’s some people that think that what we need is very capital intensive solutions, the state has already said that’s not going to work for most of Vermont, its too sparse and rural.” Vermont is very spread out and will force legislation, government officials and communities to be creative in finding solutions for truly diverting all of the organic waste in the state by 2020. The biggest challenge with the rural landscape is the issue of low-density routes and high costs of waste transportation. The hauling community has expressed that because of widely dispersed communities, it will be hard for hauling organic waste to be profitable. Hammer believes one solution to this issue is “smaller, more decentralized strategies.”

Data Charts

	Casella	Vermont Compost Company	Grow Compost	Central Vermont Solid Waste District	Myers	Cookeville Compost
Aware of Act 148 requirements	Yes	Yes	Yes	Yes	Yes	Some of them
Thoughts on Act 148 - Positive/Negative	Positive	Positive	Positive/ Negative	Positive	Positive/ Negative	Positive
Need for investment in new infrastructure	Yes	No	Yes	No	Yes	Yes

	Green Mountain Compost	T.A.M. Organics	Windham Solid Waste District	Kimbell Compost	North West Vermont Solid Waste District
Aware of Act 148 requirements	Yes	Some of them	Yes	Some of them	Yes
Thoughts on Act 148 - Positive/Negative	Positive/ Negative	Positive	Positive	Uncertain	Positive/ Negative
Need for investment in new infrastructure	Yes	Maybe	Yes	Maybe	Yes

This chart shows that out of the eleven interviews eight were entirely aware of all of the requirements of Act 148, six exemplified positive thoughts and statements on Act 148 with 4 showing positive and negative thoughts and statements on the Act, and seven will need to or already have made investments in their business due to the Act.

Composter	Windham Solid Waste District	Grow Compost	Vermont Compost Company	Green Mountain Compost	Cookeville Compost
Current Operational Cubic Yard /Tonnage	7 tons	6,000 tons	20,000 yards	3,700 tons	500 tons per year – doesn't compute 10 tons a week
Permitted Maximum Capacity	5,000 Cubic Yards	10,000 Cubic Yards	40,000 Cubic yards	24,000 Tons per Year	884 Tons Per Year
Finished Product Per Year	Unknown	6,000 Cubic Yards	Unknown	9,000 Cubic yards	300 Cubic yards
Room to Expand	Yes	Yes	Yes	Yes	Yes

These data reflect composting facilities measuring their inputs and outputs in different ways. An emphasis on weight in tons has been indicated by the solid waste industry to describe how much waste is going in and out of waste processing facilities. However in the composting industry there are many different ways to record the amount of organic waste coming into a compost facility and going out. Through interview questions and conversations held with those in the composting community, it was understood that when the raw organic waste is coming into the composting facilities it is usually recorded in wet tons, meaning the material has a high water content that contributes to its weight. However, the organic waste coming in may also be measured as cubic yards. Cubic yards of waste are not pertaining to weight as a cubic yard can refer to any material. Composters record information differently depending on how they want to relay information and to whom they are relaying it. For example the finished product of organic waste is measured in dry tons or cubic yards. It is more common for the finished compost to be

measured in cubic yards due to the way that compost is sold. A bag of compost is not sold by weight; instead it is contained in cubic yard bags. It is consistently sold in this manner, however an irregularity arises with the way composters record their own inputs and outputs of organic waste. Some record it in cubic yards and other in tons.

Further issues arise in the way that permits are given to composters in Vermont. Small, medium, and large facilities are all permitted based on a certain amount of land and amount of organic waste. However, it was discovered in the data that each facility described their maximum capacity, finished product and current operational amount in varying ways (tons and cubic yards). It is also impossible to assume whether or not the reported tons or yards are wet or dry tons and yards. It should not be inferred from the data that the report is pertaining to the dry weight of finished product. This may be a product of how the interview questions were asked, however it uncovers the inconsistencies of the reporting on organic waste flow.

The inconsistencies of the way that compost is weighed and reported is a result of permit specifications and personal preference. It is also due to whether or not composters have scales on their site to see how much food waste and other feedstocks are coming into their site. The data that is reported is often an estimation based on visual assumptions on the mass of a pile of compost. The research introduces the understanding that there are inconsistencies in the way that the compost and organic waste is measured in the state of Vermont. This means that the capacity of each composting operation will vary due to different estimations of tonnages and cubic yards. This applies to organic waste haulers as well. Many do not have access to scales and are estimating the weight of the organics they are transporting. Further research may be needed to create a consistent report on compost and feedstocks.

In order to fully understand how much more infrastructure is needed, the state of Vermont must generate homogenous and unvarying measuring techniques that do not leave out entities that lack scales as a part of their infrastructure. This result is important because it brings light to the near impossibility of predicting the current capacity of existing infrastructure. In addition, the chart shows that each composting entity has room to expand and except more organic waste. However, the expansion of composting facilities to accept more feedstocks and food waste may be partial to monetary limitations.

Hauler	Central Vermont Solid Waste District	Casella	North Western VT Solid Waste District	Myers	Kimbell Compost	T.A. M organics
Organic Material Diverted	1,300 tons per year	2,000 tons per year	6 tons per week ~288 tons per year	150 tons per year	Projected 3.6 tons per year	Projected 180 tons per year

This chart shows the organic material diverted from the landfill from the data received from the interviewed haulers. It results in a cumulative 3,921.6 tons of organic waste picked up per year by the six hauling entities interviewed. Based on a waste conversion chart, one ton of organic waste is equivalent to 265 gallons of organic waste (Solid and Hazardous Waste Management Program, n.d). Using this conversion and the study done by Highfields Institute, stating that five gallons of food waste diverted from the landfill is equivalent to preventing the greenhouse gas emissions associated with burning one gallon of gasoline, it is possible to infer that from what these haulers have prevented the emissions associated with burning 209,217.36 gallons of gasoline.

DISCUSSION

Introduction

The results of this research showed that Act 148 will influence many changes among hauling enterprises and composting businesses in the state of Vermont. Many of these changes are due to feedstocks, infrastructure, law enforcement, and financial anxieties. It is important to understand the implications of the changes to come and the future innovative ideas that can come from phased-in change.

Feedstock and Compost Inconsistencies

I found that there are many inconsistencies pertaining to compost and feedstocks in the state that create confusion among waste management entities. One of the main inconsistencies that surfaced was in the feedstocks that composters accept at their facilities.

All six of the composters that were interviewed explained that they believe their compost is of high quality and they hope for it to remain at that level throughout the implementation process of Act 148. However there are inconsistencies between compost entities. The compost facilities that accept compostable plastics still believe their compost to be of high quality even though it cannot be certified organic due to the compostable plastics. This inconsistency is important to recognize as the implementation process of Act 148 continues. If there is a disparity in what compost facilities will accept, the standard of compost will also be different and create a new source of competition among composters.

Bob Sandberg expressed his fear that if he continues to reject compostable plastics, he will lose business to those that will. The fear around competition and quality of compost can be addressed by creating a standard among all composters in the state of Vermont. However, compost businesses like Grow and VCC will not compromise in their quality standards.

Comparatively, Bob Spencer from WSWD and Dan Goosen from GMC believe it is more important to divert more organics from the landfill rather than have the highest quality finished compost product. It is a point of interest that compostable plastics are included in the ‘organics’ waste stream as something that can be safely put back into the earth. A discussion around what is more important to the state of Vermont - diverting compostable plastics or keeping our compost at the highest organic quality – would be pertinent to creating a level playing field. A statewide discussion on the importance and use of compostable plastics may be important to the future of the organic waste stream. Creating a consistent standard among composters would decrease competition and guarantee a higher quality product.

In the final report done by DSM Environmental Services, Inc. and the Project Team they found that allowing compostable paper in the organic waste stream has the likely ability to increase plastic contaminants. The report stated that “the plastic will reduce the value of the resulting compost, as well as its potential use for animal feed and/or grinding for addition to anaerobic digesters” (DSM Environmental Services et al., 2013). This illustrates the concern of the inadvertent creation of low quality compost expressed in the research.

Furthermore, if a standard of feedstocks is established, the pressure on haulers to enforce what feedstocks they accept will be easier. It will also help businesses in the state understand the implementation of the Act as one process rather than separate in different regions. One possibility could be to create a ban on compostable plastics in the state of Vermont. However if compostable plastics are not used, the alternative is petroleum-based plastic that will go to the landfill rather than be recycled or composted. In the future it will be important for composters in the state to come together to decide what their standards will be for compost so as to create consistencies that are sustainable. Another possibility pertaining to the issue of inconsistency is

that there are compost facilities that continue to accept compostable plastics as a feedstock for finished product that will not be used widely across the landscape. Instead, the compostable plastic compost could be used in road fill or erosion abatement. Whatever is decided, there has to be equal opportunity for those composters who decide they do not want to accept compostable plastics.

Creative Solutions

I found that the haulers and composters generally feel that Vermonters support the successful implementation of Act 148. Vermont residents are often community oriented and have a fundamental belief in the importance of diverting organic waste from the landfill. However, the outlying interviews indicated that while a general consensus on diverting organic waste exists, there are still those that do not care and will not be motivated to follow the new law. This is important because if residents, business owners and institutions in Vermont have a base understanding and interest in organic waste diversion it opens an avenue for creative solutions. This could mean that a greater effort is made to use existing infrastructure in innovative ways. One possibility that Leddy from the NWVSWD pointed out is using community gardens as central points for rural communities to drop off their organic waste. Another possibility that was frequently brought up was backyard composting. If residents are able to compost in their backyards a lot of the pressure on building facilities in rural regions in Vermont will be relieved. Leddy and Sandberg expressed that many Vermonters who live in rural settings are already composting. It is something that they have always done.

This finding indicates that using creative solutions such as home composting and community gardens could reduce many of the concerns around the cost of hauling waste in rural

areas. The relief in financial pressure on haulers could create space for a financial effort in educating rural communities on composting and providing home composting kits. The focus then is shifted to mitigate the contamination predicted in organic waste loads in the more densely populated areas of Vermont.

In *Zero Waste Solutions* by Paul Connet, he supports the need for creative solutions and emphasizes that we need to focus on the products going to the consumer as well as how their end life is handled. “Waste is the evidence that we are doing something wrong. Our task in the twenty-first century is not to find more and more sophisticated ways to destroy our material resources but to persuade industry and retailers to stop making products and using packaging that have to be destroyed” (Connett, 2013). Act 148 has the intention of reducing waste but it also has the power to change the connotation of waste as we know it. Changing the way waste is thought about could be a catalyst for changes on the production end of consumerism. Vermont and the businesses within it, have the opportunity to set an example for the rest of the country.

Enforcement

I found that a big concern held by the composting and hauling community is the issue of enforcement. Haulers are concerned that they will be the main enforcement entity and will not have the resources to do that. Composters are concerned that the type of trucks haulers are using does not allow them to see the contamination going into a load of organic waste. The different types of trucks either allow haulers to look into the feedstocks to judge whether the load is contaminated or not. In addition, one composter, Karl Hammer expressed his concern on accountability, specifically around the use of compostable tote liners. He expressed his concern that haulers cannot actually see what is going into the compost tote as the bag is tied shut.

Enforcing that there is no contamination in the load of organic waste will be of major importance as the implementation process moves forwards. This is also important to haulers as they decide to invest in new infrastructure for their business. This is also germane to the issue of who the haulers are delivering the organic waste feedstocks to and whether or not they accept compostable plastics. This is also a pertinent concern when confronting how the Act will be enforced and who will realistically be able to take on that role.

In the DSM Environmental report they addressed the issues of enforcement and found that unit based pricing for subscription pick up will provide some incentive for residents and businesses to separate their organics, however it is likely that enforcement will still be needed at the point of transfer and disposal. In order to successfully implement the Act, the report states that districts and private haulers will need to play a role in enforcement (DSM Environmental Services et al., 2013). However, the report also states that, “it is unreasonable to assume that private haulers will voluntarily enforce mandatory separation because they risk losing customers to haulers who are more lenient” (DSM Environmental Services et al., 2013). A level playing field must be created for the hauling community. The lack of a level playing field for all haulers will be a key concern for municipalities, districts, private haulers and ANR. The report also states that this can only happen “if there are inspections of refuse loads at the point of transfer or disposal, and if ANR is prepared to adopt regulations concerning load inspections”(DSM Environmental Services et al., 2013). The report outlines that this is the only possible way to reach high organics diversion rates due to unsustainable economic funding.

Financial Burdens

It was expressed by solid waste entities that they are concerned about the costs of Act 148 being unsustainable for small hauling businesses. While the investment in appropriate infrastructure is important to the hauling business, the resulting financial anxieties may be too much for smaller businesses to handle. Small and large trash hauling businesses will be required to offer parallel recycling and organics pick up by 2017. It is important to address the wide range of business size in the hauling community. Some businesses are small operations like TAM and others are publicly traded corporations like Casella. Because the hauling community has to offer parallel services, they are forced to make a financial investment in new infrastructure or subcontract other haulers. The disparity creates an overwhelming financial pressure on the small business owners who may not be able to survive if they are forced to make investments in new infrastructure. This is significant because there is no funding attached to any of the mandates of Act 148. The perceived financial stress could be an indicator that if funding is attached to Act 148 it should be focused on subsidizing small hauling businesses. Another possibility is to use subcontracting as a way to mitigate price challenges. If trash haulers could subcontract with a compost hauler to provide parallel collection service, no new investments in truck infrastructure would be needed. However one remaining question is how much more can current organic waste haulers collect.

This issue is addressed in the report done by DSM Environmental Services Inc. who stated that unlike recycling pick up where the cost is built into the collection service of trash, haulers will be allowed to charge an extra fee for the collection of organics. Although the cost of collection can be deflected onto the subscriber, haulers will be taking the blow of dumping a contaminated load at the landfill. If this projection of contamination is absorbed by the cost of

organic waste pickup, it will become very expensive for the subscriber. The DSM report, states, “Experience with subscription collection of recyclables, where households are required to pay extra for separate collection of recyclables, suggests that no more than 15 percent of households will be willing to pay extra for separate collection of organics” (DSM Environmental Services et al., 2013). The report explained that there is little incentive for private hauling businesses to use unit based pricing because the majority of the costs associated with collecting waste is based on the route not the amount of waste picked up. In Vermont the limiting factor in collection is the number of stops, not tons. DSM concluded from this finding that in order for unit based pricing to work and to encourage increased diversion, haulers must operate within a district (DSM Environmental Services et al., 2013).

Infrastructure

Other anxieties that surfaced were due to the lack of infrastructure available and the pressure on composting businesses to add to their existing infrastructure. The need for infrastructure was understood by all, however there was a disparity of how we should implement it. Some believe the best way to deal with the increase in organic waste is to create localized, decentralized systems. These systems will be in smaller communities and require low transportation, low energy and more flexibility to the needs of each district of Vermont. Others who were interviewed believe that in order for Act 148 to be successful, there must be a central, municipal facility in each county in Vermont.

This is important as decisions are made about where to invest to make Act 148 successful. What can be taken away from these findings is that it may not be possible to find a solution that matches the collective needs of the state. The results can help decide whether or not

a large facility is necessary in different regions of Vermont. However, there may be enough existing infrastructure that could be used creatively. There may also be districts that decide they want to have open composting sites that don't require built infrastructure. In addition, there may be districts that think the best solution is to build a large enclosed organics processing facility. Nevertheless, the main point is that there needs to be some flexibility around built infrastructure. In the final report done by DSM, it was found that roughly 30 percent of food residuals not managed through backyard composting or reduced through food banks can be delivered to inexpensive farm operations. However, construction of new composting facilities, anaerobic digesters and other infrastructure will be needed to accommodate the other 70 percent of food residuals. The estimated cost for the creation of new facilities is at least \$20 million (DSM Environmental Services et al., 2013).

Organic Waste Data

It was discovered that everyone in the composting community measures their organic waste in a different way. This raises the question of how much organic waste is currently being managed. The study by DSM and Associates predicts that there will need to be a great deal of infrastructure implemented in order to process the increase of organic waste. However, from the results it is clear that many composters roughly estimate how much organic waste they process and how much space they have to expand. All of the predictions about the amount of organic waste being processed are speculations based on experience with feedstock loads. This is significant because there may be a lot more room for expansion of existing facilities in the state of Vermont. It is clear that there will need to be investments in new infrastructure, however it may be less than predicted.

DSM addressed this in reiterating the emphasis that Act 78 put on data collection and analysis. Because of this emphasis, DSM and the Project Team found it is disappointing that there was a lack of coherent data compilation and analysis from ANR. “Because you cannot manage what you cannot measure, the success of Act 148 will depend in part on the collection, compilation and analysis of specific and standardized performance data for MSW, recyclables, organics, C&D [construction and demolition] materials and special wastes”(DSM Environmental Services et al., 2013). The state must compile accurate data in order to cast assumptions about infrastructure needs.

Carbon Issues

The competition surrounding carbon feedstocks was another prevalent concern among composters in Vermont. Much of the current carbon is going to generating electricity. This finding addresses which use is more important and whether we can separate carbon feedstocks for both composters and electricity generators. By using carbon in building compost, it is sequestered in healthy soils. In contrast, burning carbon releases harmful gasses into the atmosphere. “By sequestering carbon in the form of cellulose, composting allows carbon to remain in the soil for many months or years before being converted to carbon dioxide. Such cellulose in an incinerator is instantaneously converted to carbon dioxide” (Connett, 2013). The results show that relief needs to be provided to composters who are in constant need of carbon feedstocks. It may be beneficial to secure a source of carbon that is reserved for the use of composting. The report by DSM indicated that the Project Team agrees that finding adequate sources of carbon will be difficult if composting increases. With the concern for carbon sources already present, DSM predicts that there will be a desire to include dirty paper not suitable for

recycling as a carbon feedstock. However, this could increase contamination by plastics leading to an increase in operating costs and reduction in value and quality of finished compost product (DSM Environmental Services et al., 2013).

Collaborative Community

Another result that the research shows is that there is very little collaboration between businesses in the hauling community. The lack of communication between haulers forms a deprivation of support in their business community. In the future it will be necessary for haulers to help each other out with how to approach mandates coming into effect. In contrast, the composting community has an association that helps them work together and figure things out as a supportive group. However, there is too much competition among haulers. If a future solution to collection needs is subcontracting, communication among haulers will be increasingly important. Moving forward with Act 148 mandates, it may be a good idea for the hauling community to create an association where they can share ideas, concerns and business with each other.

In *The Zero Waste Solution* by Paul Connett, he outlines that redesigning will be central to lowering waste production. Redesign will be important to the creation of new systems, new products and new partnerships such as between the waste haulers of Vermont. He suggests one way to mitigate waste and its detriment to the earth is to create a partnership between those in power and the agricultural community. “Instead of exporting their mixed waste to landfills and incinerators located in rural areas, which causes so much intense opposition from citizens and farmers, municipal decision makers should work with farmers to coproduce a compost product from which everyone can benefit” (Connett, 2013). He also supports communicating the need of

redesign to the general public to emphasize collaboration between community and industrial responsibility to lower waste.

Suggestions For Further Research

As Connet stated in *The Zero Waste Solution*, “We can refine our waste handling procedures to yield smaller and smaller amounts of waste by removing anything recyclable, reusable, or toxic from the waste stream, but we need to do more in a zero waste program than simply landfilling the remaining residuals. We need to carefully observe and study them. This gives us our first opportunity to integrate zero waste with the higher educational system – a critical step if we want to use the zero waste strategy as a stepping-stone to sustainability” (Connett, 2013).

Working towards a lower rate of waste production, and ultimately zero waste, will require a collaborative effort of action and research. Some of the future research that became clear through this research was a need to understand how Act 148 will affect job creation and the economy of Vermont, a feasibility study on implementing public space composting such as in parks and on the street, and research to understand the percentage of products that are only disposable in a landfill to aid in accomplishing increased waste diversion. Other research that would be helpful is calculating how much CO₂ and methane that is removed from the atmosphere through diverting organic waste, as well as research finding and comparing how other rural towns across the U.S have been able to accomplish a high percentage of organic waste diversion. Finally, a study should be conducted with composting businesses across the state of Vermont to thoroughly analyze the amount of organic waste they are accepting into their facilities and how much space they have to expand. This research would clear up the issues with

data inconsistencies between composting facilities. Furthermore, research should be done to see how much it would cost to expand existing composting facilities.

Take Home Message

The big picture of this research is the need to deny the current and widely accepted definition of 'waste.' We must start understanding waste as an untapped resource. This research outlined the challenges that the hauling and composting community of Vermont will have through the implementation process of Act 148 and the work that the state of Vermont is doing to increase diversion of, not only organic waste but all other waste, from the landfill. Vermont will serve as an example for other states that seek to implement similar legislation. This research is important to the state of Vermont and state hauling and composting businesses because it allows governmental organizations, legislatures, composters, haulers and the public to understand the pressure felt by composters and haulers from the Act 148 implementation process. Hauling and compost businesses will be experiencing the biggest impact from Act 148 and will need to be supported and understood as mandates are phased in. These entities are the drivers behind the action of change. Furthermore, they are the ones in the hands on position of changing paradigms around waste. The take away message of this research is that we, as a community in Vermont, must take responsibility for our waste and support this Act in whatever was possible in order to change paradigms, set an example and shift habits of the industrial and residential world.

CONCLUSION

“Nature makes no waste, it is a human invention. Now we humans have to copy nature and reinvent an industrial world where we do not waste” (Connett, 2013).

This research presents many opportunities for the future waste stream of Vermont. It addresses issues with Act 148, excitement for the impact it will have on the waste stream, and outlines the amount of waste diverted by a small portion of composting and hauling entities in Vermont. This report outlines an avenue for change through the voices of those interviewed.

Act 148 will make history in the small progressive state of Vermont and will serve as an example for others that wish to follow Vermont’s lead. Act 148 introduces a new set of morals pertaining to waste, as well as a new way of defining it. As Karl Hammer said, in the future, “there won’t be waste as we understand it anymore, the word will have no meaning.” It is clear that we are a long way away from reaching zero waste, however the process of shifting paradigms has begun. Act 148 presents an obligation to diverting resources from the landfill and an opportunity to shift the intention of our actions to be based on an understanding of our finite world and its finite resources.

The way we currently consume and the way we manage waste is illogical and unsustainable. We create and consume products that are single use and dump them into a hole in the earth. The mentality of single use products and over-consumptive and wasteful communities are becoming a way of the past. Sandberg explained, “There really isn’t too much that needs to be thrown away.” Goosen understands that we may not reach zero waste in the near future, however after Act 148 “we’re going to be a heck of a lot further than we are now.”

This report is for the use of composting and hauling entities, the Agency of Natural Resources and anyone else who wants to understand the intricacies and implications of Act 148

and those that physically deal with Vermont's waste. It can be used to aid in the implementation process and future decision-making pertaining to the Act. This research could help Vermont transition to a new collective mentality on consumption, waste disposal, use of resources and community collaboration. The power of the example Vermont has the opportunity to set is boundless and expansive.

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